

Appendix 1: Levels in Bloom's Cognitive Domain

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

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<http://enpub.fulton.asu.edu/mcneill/blooms.htm>. Accessed January 2010 & re-accessed August 2011.

Appendix 2: Examples of Cognitive Processes and Action Verbs in Bloom's Taxonomy

Bloom's levels of thinking process begin by recognizing and recalling facts, concepts, theories, principles, procedures, criteria and steps on self learning. The recognition and recalling process is essential towards performing more complex cognitive tasks especially in understanding events, abstraction, cause and effect of physical phenomena and answering familiar textbook problems. The cognitive complexity increases as the tasks move from understanding to higher order thinking skills such as justifying an idea or action and generating new products or new ways of viewing things.

Elaboration on the six levels of thinking in Bloom's taxonomy						
1 Remembering <i>Can the student RECALL information?</i>	2 Understanding <i>Can the student EXPLAIN ideas or concepts?</i>		3 Applying <i>Can the student USE the new knowledge in another familiar situation?</i>	4 Analysing <i>Can the student DIFFERENTIATE between and RELATE constituent parts?</i>	5 Evaluating <i>Can the student JUSTIFY an opinion, decision or course of action?</i>	6 Creating <i>Can the student GENERATE new products, ideas or ways of viewing things?</i>
Recognising Locating knowledge in memory that is consistent with presented material. <u>Synonyms</u> <ul style="list-style-type: none"> Identifying Finding Selecting Indicating Recalling Retrieving	Interpreting Changing from one form of representation to another <u>Synonyms:</u> <ul style="list-style-type: none"> Paraphrasing Translating Representing Clarifying Converting Rewriting Restating Expressing 	Summarising Drawing a logical conclusion from presented information. <u>Synonyms</u> <ul style="list-style-type: none"> Abstracting Generalising Outlining Précising Inferring Abstracting a general theme or major point	Executing Applying knowledge (often procedural) to a routine task. <u>Synonyms</u> <ul style="list-style-type: none"> Carrying out Measuring Constructing Demonstrating Computing Calculating Manipulating Operating 	Differentiating Distinguishing relevant from irrelevant parts or important from unimportant parts of presented material. <u>Synonyms</u> <ul style="list-style-type: none"> Discriminating Selecting Focusing Distinguishing between Separating 	Checking Detecting inconsistencies or fallacies within a process or product. Determining whether a process or product has internal consistency. <u>Synonyms</u> <ul style="list-style-type: none"> Testing Detecting 	Generating Coming up with alternatives or hypotheses based on criteria <u>Synonyms</u> <ul style="list-style-type: none"> Hypothesizing Proposing Developing Engendering Synthesising Providing options Planning Devising a

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relevant knowledge from long-term memory. <u>Synonyms</u> <ul style="list-style-type: none">RetrievingNamingReproducingRecounting	Exemplifying Finding a specific example or illustration of a concept or principle <u>Synonyms</u> <ul style="list-style-type: none">InstantiatingIllustrating...RepresentingGiving examples ofShowing Classifying Determining that something belongs to a category (e.g., concept or principle). <u>Synonyms</u> <ul style="list-style-type: none">CategorisingSubsuming	<u>Synonyms</u> <ul style="list-style-type: none">ExtrapolatingInterpolatingPredictingConcludingExtendingGeneralising Comparing Detecting correspondences between two ideas, objects, etc <u>Synonyms</u> <ul style="list-style-type: none">ContrastingMatchingMapping Explaining Constructing a cause-and-effect model of a system. <u>Synonyms</u>	<ul style="list-style-type: none">PreparingProducingDrawing upPractising Implementing Applying knowledge (often procedural) to a non-routine task. <u>Synonyms</u> <ul style="list-style-type: none">UsingEstimatingPredictingSolvingChangingDiscoveringExplaining howVerifyingFinding	<ul style="list-style-type: none">(Sub)dividingExaminingRelating Organising Determining how elements fit or function within a structure. <u>Synonyms</u> <ul style="list-style-type: none">OutliningStructuringIntegrating(Re)arrangingCategorisingOrderingDeriving Attributing Determining the point of view, bias, values, or intent underlying presented material.	<ul style="list-style-type: none">MonitoringConcludingAssessingAppraisingDiscriminatingDetermining Critiquing Detecting the appropriateness of a procedure for a given task or problem. <u>Synonyms</u> <ul style="list-style-type: none">JudgingQuestioningJustifyingDefendingDiscussingCriticisingArguingIncludingRating	procedure for accomplishing some task. <u>Synonyms</u> <ul style="list-style-type: none">DesigningFormulatingCombiningCompilingDevisingRevisingPutting togetherSuggesting Producing Inventing a product <u>Synonyms</u> <ul style="list-style-type: none">(Re)constructingComposingModifyingAlteringBuildingEnlarging

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	<ul style="list-style-type: none"> • Organising 	<ul style="list-style-type: none"> • Elucidating • Constructing models 		<u>Synonyms</u> <ul style="list-style-type: none"> • Deconstructing • Comparing • Contrasting • Diagnosing 	<ul style="list-style-type: none"> • Ranking • Valuing

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From <http://www.tedi.uq.edu.au/downloads/assessment/quickbites/Blooms-levels-of-thinking.doc>. From "Revised Bloom's Taxonomy" retrieved 20 May, 2005 from <http://rite.ed.qut.edu.au/oz-teachernet/index.php?module=ContentExpress&func=display&ceid=29> and *Using Learning Outcomes to Design a Course and Assess Learning Outcomes*. http://www.hlst.heacademy.ac.uk/guide/current_practice/Learning.html and Moon, J. Linking Levels, Learning Outcomes and Assessment Criteria. Retrieved 30 May, 2007, from http://www.see-educoop.net/education_in/pdf/edinburgh-moon-oth-enl-t02.pdf.

Appendix 3: Two-Dimensional Bloom's Revised Cognitive Domain

This two-dimensional cognitive domain allows you to specify the learning complexities (depth or competency) in the four knowledge dimensions. The cells can be used to indicate the learning outcomes and hence the assessment targeted for each course.

Cognitive Process Dimension: From Lower Order (1 & 2) to Higher Order (3-6) Thinking Skills							
	<p>This revised Bloom's Taxonomy will assist you as you work to improve instruction to ensure that</p> <ul style="list-style-type: none"> 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
Knowledge Dimension	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 interrelationships 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						

Cognitive Process Dimension: From Lower Order (1 & 2) to Higher Order (3-6) Thinking Skills							
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Knowledge Dimension	<p>C. Procedural knowledge: How to do something: methods of inquiry, and criteria for using skills, algorithms, techniques and methods</p> <ol style="list-style-type: none"> Knowledge of subject specific skills and algorithms Knowledge of techniques and methods Knowledge of criteria for determining when to use appropriate procedures 						
	<p>D. Metacognitive knowledge: knowledge of cognition in general as well as awareness of one's own cognition</p> <ol style="list-style-type: none"> Strategic knowledge Cognitive tasks, including appropriate contextual and conditional knowledge Self-knowledge 						

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

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