DoD 8140 Proficiency Levels SOP

Version 1.0

Issued on August 30, 2024

Prepared by

The Office of the DoD Deputy Chief Information Officer for Resources & Analysis,

Workforce Innovation Directorate

Contents

Proficiency Levels

What are proficiency levels?

A proficiency level illustrates a learner's performance expectations and competency. There are three distinct levels:

- **Basic** – At this level, the role requires an individual to have familiarity with basic concepts and processes and the ability to apply these with frequent, specific guidance.
- **Intermediate** – At this level, the role requires an individual to have extensive knowledge of basic concepts and processes and experience applying these with only periodic high-level guidance. An individual must be able to perform successfully in non-routine and sometimes complicated situations.
- **Advanced** – At this level, the role requires an individual to have an in-depth understanding of advanced concepts and processes and experience applying these with little to no guidance. An individual must be able to serve as a resource and provide guidance to others.

Creation of Training Standards

Terminal Learning Objectives (TLOs)

TLOs identify broad learning outcomes that learners should be able to demonstrate upon completion of training. The TLOs are purposefully written at a lower level (i.e., Basic) to ensure understanding of the concept by learners. This approach establishes a common Enterprise baseline, and Components are encouraged to adjust the TLOs to meet their specific mission needs. The number of TLOs in each work role differs based on the number of core tasks and knowledge, skills, abilities (KSAs) for the work role. As a result, there is a minimum of one TLO and a maximum of 6 TLOs per work role.

TLO: Describe strategies for designing a knowledge management framework.

Figure 1: TLO Example

Indicators of Learning (IOLs)

IOLs identify specific learning outcomes that are derived from TLOs. They provide Components with ideas for how learners can demonstrate progress toward meeting TLOs in a training setting.

Each TLO has three corresponding IOLs to reflect these proficiency levels: 1) Basic; 2) Intermediate; and 3) Advanced. To determine the proficiencies of the IOLs, DoD CIO leveraged *Bloom's Revised Taxonomy of Learning*, which arranges learning hierarchically from lower-level cognition (i.e., remembering) to higher-order thought (i.e., creating), and each level builds on the foundation of the previous level(s).

Based on Bloom's Taxonomy of Learning in Figure 2, the IOL proficiencies are as follows:

- Basic proficiency correlates with Bloom's Remember and Understand;
- Intermediate proficiency correlates with Apply and Analyze; and,
- Advanced proficiency correlates with Evaluate and Create.

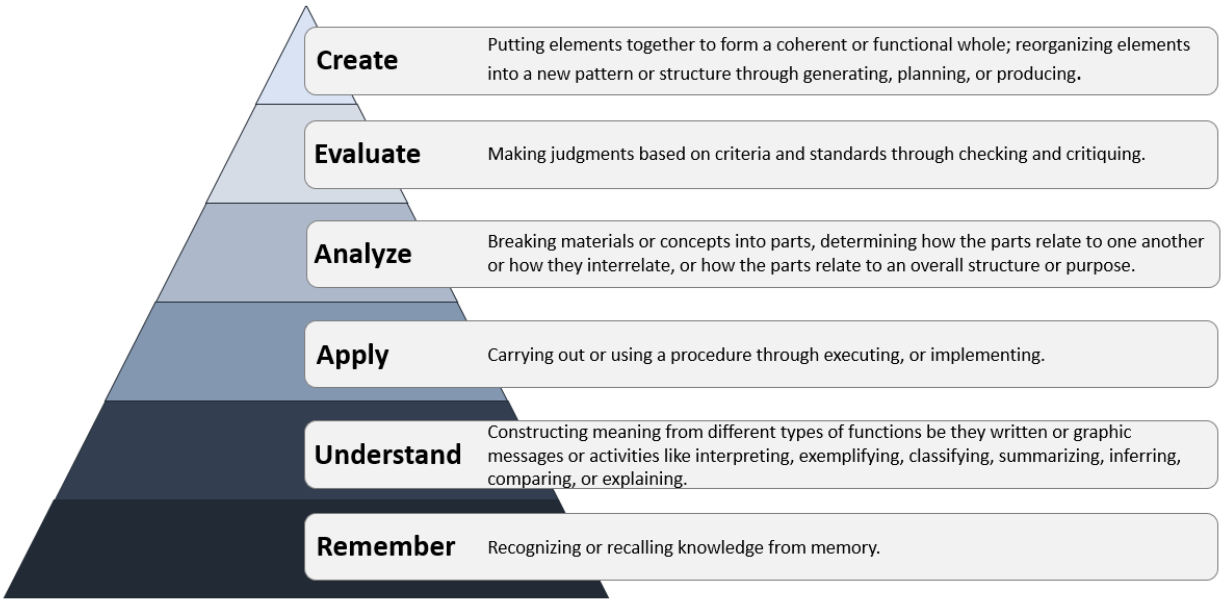

Figure 2: Bloom's Taxonomy of Learning

As with the TLOs, the IOLs serve only as *examples* for Components to leverage when developing and/or updating their own cyber training courses. Table 1 provides an example of a TLO and associated IOLs for the Knowledge Manager work role.

Table 1: Sample Training Standard for Knowledge Manager Work Role

TLO:	**Describe strategies for designing a knowledge management framework.**
Basic IOL	Explain the value of a knowledge management framework to an organization.
Intermediate IOL	Estimate the potential challenges of implementing a new knowledge management framework.
Advanced IOL	Evaluate an organization's knowledge management framework.

Bloom's Taxonomy

TLOs/IOLs describe the intended learning outcomes and indicators that result from training courses. They include the subject matter content and a description of what is done with or to the content. Statements of objectives typically include a noun or noun phrase and a verb or verb

phrase. In Bloom's Revised Taxonomy, the noun and the verb form separate dimensions; the noun is the basis for the Knowledge dimension and the verb forms the basis for the Cognitive Process dimension. Consider the following example of an Advanced IOL: "Evaluate an organization's knowledge management framework" – it includes a noun phrase ("an organization's knowledge management framework") consistent with the conceptual knowledge category and a verb phrase ("Evaluate") consistent with evaluate cognitive process (i.e., advanced proficiency level).

The Knowledge Dimension

The Knowledge dimension of Bloom's Revised Taxonomy is made up of four categories:

A. Factual Knowledge – The basic elements that students must know to be acquainted with a discipline or solve problems in it. This includes knowledge of terminology and of specific details and elements.
B. Conceptual Knowledge – The interrelationships among the basic elements within a larger structure that enable them to function together. This includes knowledge of classifications and categories, of principles and generalizations, and of theories, models, and structures.
C. Procedural Knowledge – How to do something; methods of inquiry, and criteria for using skills, algorithms, techniques, and methods. This includes knowledge of subject-specific skills and algorithms, of subject-specific techniques and methods, and of criteria for determining when to use appropriate procedures.
D. Metacognitive Knowledge – Knowledge of cognition in general as well as awareness and knowledge of one's own cognition. This includes strategic knowledge (i.e., knowledge of general strategies for learning, thinking, and problem solving), knowledge about cognitive tasks (including appropriate contextual and conditional knowledge), and self-knowledge (i.e., knowledge of one's strengths and weaknesses).

The Cognitive Process Dimension

The Cognitive Process dimension of Bloom's Revised Taxonomy is made up of six categories:

1. Remember – Retrieving relevant knowledge from long-term memory.
   - *Recognizing* (or identifying) involves locating knowledge in long-term memory that is consistent with presented material.
   - *Recalling* (or retrieving) involves retrieving relevant knowledge from long-term memory.
2. Understand – Determining the meaning of instructional messages, including oral, written, and graphic communication.
   - *Interpreting* (or clarifying/paraphrasing/representing/translating) involves the conversion of information from one form of representation to another.
   - *Exemplifying* (or illustrating/instantiating) involves finding a specific example or instance of a general concept or principle.

- *Classifying* (or categorizing/subsuming) involves determining that something (e.g., a particular instance or example) belongs to a certain category (e.g., concept or principle).
- *Summarizing* (or abstracting/generalizing) involves producing a short statement that represents presented information or abstracts a general theme.
- *Inferring* (or concluding/extrapolating/interpolating/predicting) involves drawing a logical conclusion from presented information.
- *Comparing* (or contrasting/mapping/matching) involves detecting similarities and differences between two or more objects, events, ideas, problems, or situations.
- *Explaining* (or constructing models) involves mentally constructing and using a cause-and-effect model of a system of series.

3. Apply – Carrying out or using a procedure in a given situation.
   - *Executing* (or carrying out) involves applying a procedure to a familiar task (i.e., an exercise).
   - *Implementing* (or using) involves applying one or more procedures to an unfamiliar task (i.e., a problem).
4. Analyze – Breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose.
   - *Differentiating* (or discriminating/selecting/distinguishing/focusing) involves discriminating relevant from irrelevant parts or important from unimportant parts of presented material.
   - *Organizing* (or finding coherence/integrating/outlining/parsing/structuring) involves determining how elements fit or function within a structure.
   - *Attributing* (or deconstructing) involves determining the point of view, biases, values, or intent underlying presented material.
5. Evaluate – Making judgments based on criteria and standards.
   - *Checking* (or coordinating/detecting/monitoring/testing) involves detecting inconsistencies or fallacies within a process or product, determining whether a process or product has internal consistency, or detecting the effectiveness of a procedure as it is being implemented.
   - *Critiquing* (or judging) involves detecting inconsistencies between a product or operation and some external criteria, determining whether a product has external consistency, or judging the appropriateness of a procedure for a given problem.
6. Create – Putting elements together to form a novel, coherent whole or make an original product.
   - *Generating* (or hypothesizing) involves inventing alternative hypotheses based on criteria.
   - *Planning* (or designing) involves devising a method for accomplishing some task.
   - *Producing* (or constructing) involves inventing a product.

The Two-Dimensional Approach

The two-dimensional approach of Bloom's Revised Taxonomy can be illustrated via the Taxonomy Table of the interactions between the knowledge and cognitive process categories. The Taxonomy Table could be used to:

- Evaluate overall course alignment of proficiency levels;
- Identify dimensions that are disproportionately represented within a training/under a TLO (e.g., IOLs only reflect one or two knowledge dimensions; IOLs only reflect higher-level cognitive processes);
- Identify IOLs that are inappropriate classified or indicate gaps (e.g., blank areas of the table present missing learning opportunities).

The Knowledge Dimension	*The Cognitive Process Dimension*					
	Remember	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Create**
Factual Knowledge						
Conceptual Knowledge						
Procedural Knowledge						
Metacognitive Knowledge						

The Taxonomy Table below includes a selection of verbs that qualify the intersections between Knowledge Dimensions and Cognitive Process Dimensions. These verbs can be used at the start of corresponding IOLs, such that "Learners will be able to…" could precede it.

The Knowledge Dimension	*The Cognitive Process Dimension*					
	Remember	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Create**
Factual Knowledge	List	Summarize	Respond	Select	Check	Generate
Conceptual Knowledge	Recognize	Classify	Provide	Differentiate	Determine	Assemble
Procedural Knowledge	Recall	Clarify	Carry out	Integrate	Judge	Design
Metacognitive Knowledge	Identify	Predict	Use	Deconstruct	Reflect	Create

Considerations for Bloom's Taxonomy of Learning

Bloom's Taxonomy of Learning is a framework to aid in the development of TLOs and IOLs.

It is not necessary to always start with lower-level skills and step through the entire taxonomy for each concept within a course; it is important to consider the level of learners in the course. For newer or less-experienced learners, it may be helpful to target lower-level cognition (i.e., remembering and understanding) and strive for some mid-level cognition (i.e., applying and analyzing); avoid getting too far up the taxonomy to mitigate frustration and unachievable goals. For more seasoned or experienced learners, it would not be optimal to focus on lower-level cognition (i.e., remembering and understanding) if they are expected to have a foundational knowledge. Rather, focus on higher-level cognition to avoid boredom or apathy.

An effective IOL is measurable, clear, and concise. Indicators should include only one verb; more than one verb can lead to unclear assessments of mastery (i.e., the student may only master one part of the outcome). TLOs should be written with one verb—the verb associated with the highest cognition level of the IOL according to Bloom's Taxonomy.

Appendices

Appendix A: The Knowledge Dimension

The Knowledge Dimension		
Factual Knowledge	The basic elements that students must know to be acquainted with a discipline or solve problems in it.	Knowledge of… • Terminology • Specific details and elements
Conceptual Knowledge	The interrelationships among the basic elements within a larger structure that enable them to function together.	Knowledge of… • Classifications and categories • Principles and generalizations • Theories, models, and structures
Procedural Knowledge	How to do something; methods of inquiry, and criteria for using skills, algorithms, techniques, and methods.	Knowledge of… • Subject-specific skills and algorithms • Subject-specific techniques and methods • Criteria for determining when to use appropriate procedures
Metacognitive Knowledge	Knowledge of cognition in general as well as awareness and knowledge of one's own cognition.	• Strategic knowledge (i.e., knowledge of general strategies for learning, thinking, and problem solving) • Knowledge about cognitive tasks, including appropriate contextual and conditional knowledge • Self-knowledge (i.e., knowledge of one's strengths and weaknesses)

Appendix B: The Cognitive Process Dimension

The Cognitive Process Dimension		
Remember	Retrieving relevant knowledge from long-term memory.	• Recognizing • Recalling
Understand	Determining the meaning of instructional messages, including oral, written, and graphic communication.	• Interpreting • Exemplifying • Classifying • Summarizing • Inferring • Comparing • Explaining
Apply	Carrying out or using a procedure in a given situation.	• Executing • Implementing
Analyze	Breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose.	• Differentiating • Organizing • Attributing
Evaluate	Making judgments based on criteria and standards.	• Checking • Critiquing
Create	Putting elements together to form a novel, coherent whole or make an original product.	• Generating • Planning • Producing

Reference List

- Anderson, L.W., Krathwohl, D.R., Airasian, P.W., Cruikshank, K.A., Mayer, R.E., Pintrich, P.R., Raths, J., Wittrock, M.C. (2001). *A Taxonomy for Learning, Teaching, and Assessing: A revision of Bloom's Taxonomy of Educational Objectives*. New York: Pearson, Allyn & Bacon.
- Department of Defense. (2018). Summary: Department of Defense Cyber Framework 2018. https://media.defense.gov/2018/Sep/18/2002041658/-1/-1/1/CYBER_STRATEGY_SUMMARY_FINAL.PDF
- Krathwohl, D.R. (2002). A Revision of Bloom's Taxonomy: An Overview. *Theory Into Practice, 41*(4). 212–218. http://www.jstor.org/stable/1477405
- Mayer, R.E. (2002). Rote Versus Meaningful Learning. *Theory Into Practice, 41*, 226–232. https://doi.org/10.1207/s15430421tip4104_4
- National Institute of Standards and Technology – U.S. Department of Commerce. Newhouse, W.; Keith, S.; Scribner, B.; & Witte, G. (2017, August). National Institute for Cybersecurity Education (NICE) Cybersecurity Workforce Framework. NIST Special Publication 800-181, https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-181.pdf
- Pintrich, P. R. (2002). The Role of Metacognitive Knowledge in Learning, Teaching, and Assessing. *Theory Into Practice*, *41*(4), 219–225. http://www.jstor.org/stable/1477406