

Credential Maintenance Working Group

Learning Objective Guideline for Individual Learning Activities

Purpose

The purpose of this document is to provide guidance to individual learning activity (ILA) applicants and ILA/ Continuing Education Review Panel (CERP)/Provider applicant reviewers some best practices for writing learning outcomes. Learning outcomes are an important step in the development of instruction and assessment using a systematic approach to training.

It is important to note that ILA/CERP/Provider reviewers are not expected to edit the submitted learning outcomes. The reviewers will use them to assist in determining if the instruction and assessment methods described can measure the knowledge, skill, or attitude that would be changed through training.

Learning Objectives

Understanding and Building Learning Objectives

Effective training begins with understanding and building effective **learning objectives**. Learning objectives communicate what the target audience will know or be able to perform at the conclusion of a **structured learning activity**.

Learning Objectives (LO) are applicable to all types of learning activities. The intent and nature of NERC's continuing education requirements necessitate that learning objectives reflect the **knowledge, skills, and attitudes**¹ (KSAs) required for NERC certified system operators to perform the tasks associated with their respective certification.²

The behavior associated with each learning objective can be classified within groups known as **content domains**. These content domains are **cognitive, psychomotor, or affective** (Figure 1³). Learning objectives state what a learner should know or be able to do by successfully completing the course.



Figure 1: Content Domains for Learning Objective Behaviors

¹ The DOE Handbook refers to "Abilities" instead of "Attitudes." In this document, we default to "Attitudes," which is a more traditional interpretation of the "A" in "KSA." Given the close relationship between ability and skill, the use of "Abilities" may cause confusion. Furthermore, "Attitudes" is more consistent with behaviors in the affective domain.

² Reference the *NERC System Operator Certification Program Manual* for additional information regarding NERC certification requirements.

³ Fein 2012 <https://www.foc-network.org/files/Career-Pathways-as-a-Framework-by-David-Fein.pdf>

Learning objectives consist of **three parts**:

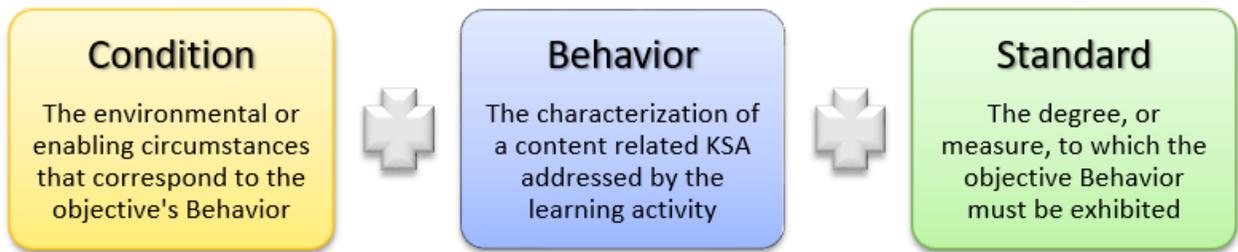


Figure 2: Learning Objectives Parts

Example of a Learning Objective:



Figure 3: Learning Objective Example

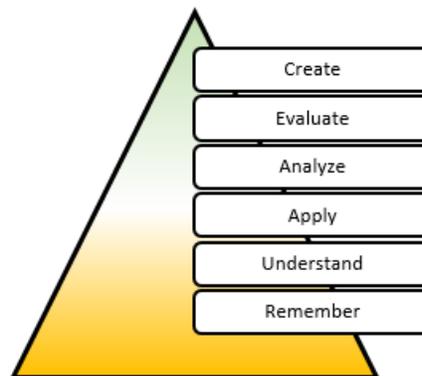


Figure 4: Blooms Revised Taxonomy Ordinal Levels from Highest to Lowest (Top to Bottom).

Content Domains

Content domains are often represented by pre-defined **taxonomies**, or classifications. Taxonomies distinguish between ordinal levels of a given content domain and typically provide example action verbs for each level. When these verbs are properly used to construct learning objective behavior statements, they accurately convey the level (or extent) to which KSAs will be taught.

 **Note:** Where applicable, the suggested practices in this document will utilize Bloom's Revised Taxonomy for Cognitive objectives,⁴ Dave's Taxonomy for Psychomotor objectives,⁵ and

⁴ <https://tophat.com/blog/blooms-revised-taxonomy-pyramid/>

⁵ https://www.researchgate.net/publication/47707261_A_Conceptual_Framework_for_Serious_Games_and_its_Validation

Bloom's Taxonomy for Affective objectives.⁶

Examples of verbs for each taxonomy are given in **Table 2**, **Table 3**, and **Table 4**. There are other taxonomies available for use; these are listed in **Appendix D**.

Learning objectives constructed with plausible conditions, required behaviors, and applicable standards, provide a sound framework for the **design, development, and assessment** of structured learning activities.

Suggested Practice

How to Construct Learning Objectives:

1. Begin by identifying the associated **KSAs** that will be taught, developed, or modified through training. Where available, utilize KSAs derived from company-specific, real-time reliability-related system operator tasks. One may also refer to the corresponding NERC certification examination content outline task list that can be found in the *SOC Program Manual*.⁷
2. Correlate each identified KSA to one or more of the **recognized operator training topics** in the NERC SOC Manual Appendix A.⁸
3. Identify the **condition(s)** under which learners will be able to exhibit each KSA. The identified condition(s) should reflect, to the extent possible, **the real-time application of the KSA and the conditions under which learners will be assessed**.

Sample Conditions for Learning Objectives

- Given access to Operational Documents
- Given indication of a tripped breaker
- From memory
- Without the use of a reference
- Given the actuation of a Remedial Action Scheme

 **Note:** It is not unusual for multiple learning objectives within the same content domain to have the same condition(s).

4. Identify the **behavior(s)** learners will be able to exhibit for as it pertains to each KSA by first determining the level to which each KSA will be taught. Recall that taxonomies distinguish between ordinal levels of a given content domain and typically provide example action verbs (**Table 1**) for each level. **Behaviors are qualified by verbs that reflect the degree or level to which each KSA will be taught and the manner in which it will be validated (i.e. assessed)**. Select a verb for each KSA accordingly.

⁶ [Bloom's Taxonomy: Affective Domain. Centre for Teaching Excellence, University of Waterloo.](#)

⁷ [https://auth.internal.nerc.com/pa/Train/SysOpCert/System Operator Certification DL/SOC Program Manual 2019.pdf](https://auth.internal.nerc.com/pa/Train/SysOpCert/System%20Operator%20Certification%20DL/SOC_Program_Manual_2019.pdf)

⁸ [https://auth.internal.nerc.com/pa/Train/SysOpCert/System%20Operator%20Certification%20DL/SOC Program Manual 2019.pdf](https://auth.internal.nerc.com/pa/Train/SysOpCert/System%20Operator%20Certification%20DL/SOC_Program_Manual_2019.pdf)

 **Note:** Be mindful that some behaviors are more difficult to assess than others. For instance, a behaviors utilizing verbs such as “calculate” and “identify” are more easily assessed on a written exam than a behavior that utilizes the verb “understand.” In part, this is because “calculate” and “identify” can be assessed directly, while “understand” cannot. Rather, “understand” may necessitate assessing multiple perspectives on a written exam in order to accurately determine whether that learning objective has been met. At times, it may be beneficial to substitute the verb “understand” with a verb such as explain or describe, which points to how you will evaluate the objective.

Table 1: Behavior Verb Usage for Varying Levels of Content Domains		
Content Domain	Level	Sample Verbs
Low Level Cognitive	Remembering Involves the need to recall information	Identify Recall Recognize
High Level Cognitive	Evaluating Involves judging a set of variables	Predict Interpret Summarize
Psychomotor	Manipulation Involves performing an action	Perform Execute Implement
Affective (See note below)	Internalize Values Involves exhibiting a behavior consistent with organizational and industry values	Verify Display

 **Note:** The affective content domain is rarely used but may be suitable for use in support of other credential topics. These types of objectives may require additional clarification to determine if CEHs may be awarded.

Sample Behaviors for Learning Objectives

- **Low Level Cognitive:** Recall the purpose of Remedial Action Scheme XYZ
- **High Level Cognitive:** Summarize the operation of Remedial Action Scheme XYZ
- **Psychomotor:** Perform the immediate actions associated with actuation of Remedial Action Scheme XYZ
- **Affective:** Display a questioning attitude prior to taking Remedial Action Scheme XYZ out of service

 **Note:** Notice how behaviors begin with a verb related to the content domain level.

5. Identify the standard(s), or degree, to which learners will be able to exhibit each KSA as a result of the learning activity. The identified standard(s) should be predefined and reflect, to the extent possible, **the real-time application of the KSA and the *criteria* that learners will be held to when assessed.**

Sample Standards for Learning Objectives:

- Without error.
- Within the acceptable range
- Correctly
- In accordance with procedure XYZ
- Per Management expectation.

 **Note:** It is not unusual for multiple learning objectives within the same content domain to have the same standard(s).

6. Construct each learning objective utilizing the identified condition, behavior, and standard for each KSA.

Sample Learning Objectives:

- **Low Level Cognitive:** From memory, recall the purpose of Remedial Action Scheme XYZ, without error
- **High Level Cognitive:** Without the use of a reference, summarize the operation of Remedial Action Scheme XYZ, correctly
- **Psychomotor:** Given access to Operational Documents, perform the immediate actions associated with actuation of Remedial Action Scheme XYZ in accordance with Procedure XYZ
- **Affective (see note below):** While establishing prerequisite maintenance conditions, display a questioning attitude prior to taking Remedial Action Scheme XYZ out of service in accordance with management expectations

 **Note:** The affective content domain is rarely used but may be suitable for use in support of other credential topics. These types of objectives may require additional clarification to determine if CEHs may be awarded.

7. Validate that that each learning objective satisfies the requirements outlined in the ***NERC System Operator Certification Manual, Appendix A.***⁹

⁹ https://auth.internal.nerc.com/pa/Train/SysOpCert/System%20Operator%20Certification%20DL/SOC_Program_Manual_2019.pdf

Fundamental Knowledge-Based Learning Objectives

Fundamental knowledge-based learning objectives may be utilized for training intended to do the following:

- Establish or bolster fundamental knowledge and to cover the operational theory behind new and innovative equipment
- Enhance trainee level of knowledge on a piece of equipment or operating process
- Address how equipment responds under varying system conditions
- Reinforce key technical and compliance related aspects of real-time operations

These objectives tend to be broadly applicable to system operator BES reliability-related responsibilities and/or support NERC Certified System Operator required competencies.

Sample Fundamental Knowledge-Based Learning Objectives

- Given values for Real Power and Apparent Power, calculate Reactive Power without error.
- Given existing system conditions, describe how synchrophasor technology will be used to enhance system operator displays in accordance with the proposed project plan.
- Given applicable system drawings, distinguish between substation XYZ topology for pre- and post-Transformer XYZ installation, per the proposed installation plan.
- Given the proposed NERC Reliability Standard XYZ-001-2, determine which operator displays will need to be re-configured per Procedure XYZ, Operational Display Requirements.

When assessing the use of these objectives in a SLA, ensure their intent comports with credentialing maintenance topical requirements (Reference *SOC Manual*, Appendix A).¹⁰

¹⁰ https://auth.internal.nerc.com/pa/Train/SysOpCert/System%20Operator%20Certification%20DL/SOC_Program_Manual_2019.pdf

Appendix A: Verbs for the Cognitive Domain

In **Table 2** Instructional strategies are shown in column two and sample verbs are listed in column three. Post-secondary and corporate training often use verbs in the levels of “*understand*,” “*apply*,” and “*analysis*.”^{11, 12}

Cognitive Level	Instructional Strategy	Verb
Remember	Lecture, visuals, video, audio, examples, illustrations, analogies	Define, recall, repeat, state, record, list, duplicate, memorize
Understand	Questions, discussion, review, learner, presentations,	Translate, restate, discuss, describe, recognize, explain, express, identify, classify, locate, select
Apply	Exercises, practice, demonstration, projects, simulations, role play	Interpret, apply, employ, use, demonstrate, dramatize, practice, illustrate, operate, schedule, sketch, solve
Analysis	Problems, exercises, case studies, critical incidents, discussion,	Differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test, appraise, calculate, criticize, diagram, inspect, debate, inventory
Evaluate	Projects, problems, case studies, develop plans, create simulations	Appraise, argue, defend, judge, select, support, value, critique, weigh, compose, plan, propose, design, formulate, arrange, create, construct, set up, organize, manage, prepare
Create	Case studies, project, investigations, exercises, simulations	Author, investigate, design, assemble, develop, conjecture, judge, evaluate, rate, compare, evaluate, score, assess, estimate, select

¹¹ Adapted from Quevillon, K. (2018, October 18). Bloom’s Revised Taxonomy: 3 Ways to Reshape the Pyramid [Web Log Post].

<https://tophat.com/blog/blooms-revised-taxonomy-pyramid/>

¹² Adapted from Shank, P. (2013, February 14). eLearning Guild Research: Reconsidering Bloom’s Taxonomy (Old AND New) [Web Log Post].

<https://learningsolutionsmag.com/articles/1105/elearning-guild-research-reconsidering-blooms-taxonomy-old-and-new>

Appendix B: Verbs for the Psychomotor Domain

Dave's 1967/70 taxonomy lends itself perfectly to the articulation of progressive manual skills development in vocational training contexts^{13,14} (Table 3).

Table 3: Verbs for the Psychomotor Domain

Psychomotor Level	Instructional Strategy	Verb
Imitate	Watch instructor, trainer, or expert and repeat action, process, or activity	Attempt, carry out, copy, duplicate, follow, mimic, imitate, move, practice, proceed, repeat, replicate, reproduce, respond, organize, sketch, try, attempt, volunteer
Manipulate	Perform task by following written or verbal instructions	acquire, complete, conduct, do, use, execute, handle, implement, improve, maintain, make, manipulate, operate, pace, produce, progress, recreate
Precision	Perform a task or activity with expertise and to high quality without assistance or instruction. Able to demonstrate an activity to other learners with minimal errors and more precision. Performance is smooth and accurate.	Perform skillfully, become expert, achieve, accomplish, advance, automatize, calibrate, complete, control, demonstrate, differentiate (by touch), exceed, excel, master, perfect, reach, refine
Articulate	Solve problems by developing or modifying methods to meet new or varying requirements	Adapt, adjust, alter, change, construct, combine, coordinate, customize, develop, excel, formulate, integrate, master, modify, rearrange, reorganize, revise, re-sequence, solve
Naturalization	Define aim, approach, and strategy for use of activities to meet strategic need without thinking	Flawless, perfect, arrange, combine, compose, construct, create, design, invent, manage, originate, project manage, refine

¹³ Yusoff, Amri (2010): *A Conceptual Framework for Serious Games and its Validation*.

https://www.researchgate.net/publication/47707261_A_Conceptual_Framework_for_Serious_Games_and_its_Validation

¹⁴ Bloom's Taxonomy: Psychomotor Domain. (n.d.) <https://studylib.net/doc/5832978/bloom-s-taxonomy--psychomotor-domain>

Appendix C: Verbs for Affective Domain

This domain includes the manner in which we deal with things emotionally, such as feelings, values, appreciation, enthusiasms, motivations, and attitudes. These can include individual and team reliability centered tasks, safety, human performance, and customer service requirements. See [Table 4](#).

Table 4: Verbs for Affective Domain

Affective Level	Instructional Strategy	Verb
Receiving phenomena	Passively listening to receive information and willing to engage in a task or process	Accept, acknowledge, be aware, listen, notice, pay attention
Responding to phenomena	Conforming with rules and using information provided during the task or activity	Agree to, assist, communicate, conform, consent, follow, obey, respond, volunteer
Valuing	Giving meaning to the rules so they become more intuitive and easier to follow	Adopt, assume responsibility for, express, initiate, show concern for, use resources to
Organization	Combining information and taking action accordingly towards game objectives	Adapt, adjust, balance, group, organize, rank
Internalizing values (characterization)	Adapting belief and behavior to apply task or process learning outcomes in the real situations	Act upon, advocate, defend, exemplify, influence, serve, support

Appendix D: Other Taxonomies for Learning Objective Development

- Simpson's Psychomotor Domain¹⁵
- Harrow's Psychomotor Domain

¹⁵ <https://thepeakperformancecenter.com/educational-learning/learning/process/domains-of-learning/psychomotor-domain/>

Appendix E: Version History

Table 5: Learning Objective Guidance Version History

Date	Page	Description	Version
2/11/2021	All	Approved by the Personnel Certification Governance Committee	1.0