

SciLifeLab Training Hub – Learning Outcomes Guide

This guide is a resource for instructors developing training for the SciLifeLab community. Best practices for creating Learning Outcomes (LOs) are to consider SMARTIE Principles, Bloom's Taxonomy, KSAs and Performance Level Descriptors. The LO development process is also intended to be iterative: LOs inform course content, and that course content will inform LOs.

What are Learning Outcomes?

LOs describe the measurable knowledge, skills, or abilities that learners should be able to demonstrate as a result of completing a course or training. They are learner-centred rather than instructor-centred, in that they describe what the participants will do, not what the instructor will teach.

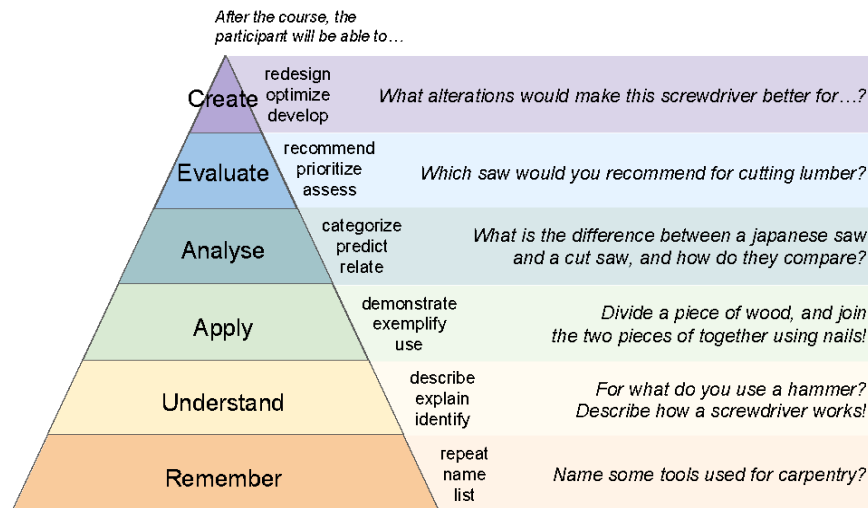
The **SMARTIE** principles should be followed so that LOs are:

- **Specific:** to help make expectations clear and to remove ambiguity whenever possible
- **Measurable:** in order to determine whether the learner can perform at the level that is expected and to determine whether knowledge-, skill- and ability- transfer has been successful.
- **Achievable:** that the expectations are achievable considering the level the learner begins with, and the time on hand.
- **Relevant:** that the learning falls within the scope of the course or training goals.
- **Time-Bound:** that the learning falls within a set period of time.
- **Inclusive:** consider the diverse needs and backgrounds of your students—your outcomes should be accessible to everyone.
- **Equitable:** ensure your outcomes don't favor one group over another—all students should have equal opportunities for success

What is Bloom's Taxonomy and how can it inform Learning Outcomes?

Bloom's Taxonomy is a hierarchical classification system used to define and distinguish different levels of human cognition—i.e., thinking, learning, and understanding. It contains a series of verbs classified from beginner to expert. Bloom's Taxonomy is helpful in developing LOs as it structures how to identify:

1. The level of understanding that a learner will begin with (prerequisites)
2. The level of understanding that the instructor intends for the learner to come away with (learning outcomes)
3. A pathway for the instructor to scaffold learning progression



Bloom's taxonomy (revised)

Bloom's Taxonomy of Learning – A visual guide for learning from beginner to expert

Knowledge, Skills and Abilities

KSAs (Knowledge, Skills and Abilities) are a framework for categorizing what can be learned, and can be useful when determining what course participants should gain from their training.

LOs should be specific which **KSA** will be gained:

- **Knowledge:** the subjects, topics, and items of information gained (eg: the history of RNAseq, biochemistry, genetic diversity of arctic foxes)
- **Skills:** technical or manual proficiencies learned or acquired (eg: presenting a scientific poster, proteomics technique, creating a Learning outcome)
- **Abilities/Attitudes:** demonstrable capacity to apply both knowledge and skills in order to complete a task or perform an observable behaviour (eg: critical thinking, independent project design, leadership)

What are Performance Level Descriptors (PLDs)?

Performance Level Descriptors (PLDs) are a means of standardizing the expectations needed for learners to achieve different levels of success, and are a way of clarifying the level of KSA required. PLDs are commonly seen in rubric formats, which can reflect a scoring of learner performance across a range of different knowledge, skills and abilities.

Some common PLDS include:

- **Introductory:** the participant may not have interacted with the material or concepts previously.
- **Intermediate:** the participant is building on introductory KSA to reach a higher level.

- **Advanced:** the participant has interacted significantly with the material or concepts and can use these with some independence.
- **Expert:** the participant interacts independently to expand the material or concepts and seeks to collaborate with other experts.

By combining the principles of Bloom's Taxonomy, KSAs, PLDs and SMARTIE goals together in your learning outcomes, it becomes easier to communicate the function and expectations of your training to your participants as well as other instructors. As Learning Pathways and tailored curriculum become available for advanced life science training, having accurate learning outcomes also helps organize and connect your training within the larger ecosystem!

Have questions? Connect with us at traininghub@scilifelab.se