

Interactive Workshop on STE 2026

March 11 - 13, 2026, „Transilvania” University of Brasov, Romania

Workshop: Basics of modern laboratory pedagogy in STEM education: Workshop on Intended Learning Outcomes and Evaluation

CA describes the alignment of ILOs referring to what students are expected to learn, by which actions they will learn what they are expected to (Teaching Learning Activities (TLAs)) and how Assessment Tasks (ATs) assess to which degree they achieved the ILOs. To describe the degree of proficiency the students are expected to achieve, ILOs can be formulated using the SOLO taxonomy, which defines four levels of understanding ranging from rudimentary to abstract transfers. This approach is highly transparent to the students and more abstract/demanding tasks place emphasis on student-centered scientific inquiries. Both increase students' motivation due to higher autonomy and an increased sense of competence. Through pre-tests, educators can assess the students' comprehension and proficiency prior to conducting the laboratory allowing to better address students' needs at their current level of understanding.

By posing the same or similar questions after the laboratory (post-test), the students' increase in comprehension and competence resulting from the laboratory can be measured and evaluated. After a brief introduction of the underlying theory of the SOLO taxonomy, CA and pre-and post-tests, an exemplary cross reality-laboratory about chemical extraction is presented. The ILOs are formulated and the respective pre-and post-tests are constructed.

With this material at hand, the participants are instructed to create ILOs for their laboratories with the help of the workshop presenters. Afterwards, the focus will be set on the development of fitting questions for pre- and post-tests to evaluate the student's learning progress before and after conducting the respective laboratories.

Workshop Objectives, Target Audience, and Required Equipment (if applicable)

After attending this workshop, participants will be able to assess and reformulate Intended Learning Outcomes (ILOs) of their STEM laboratories based on the SOLO taxonomy (Structure of Observed Learning Outcomes) to agree with Constructive Alignment (CA). Furthermore, they will be able to design pre- and post-tests that allow for a structured assessment of students' learning progress when conducting the laboratory. To achieve these objectives, participants will reflect on and (re-)formulate ILOs for their (digital) laboratories in a first work phase and develop pre- and post-test tasks to assess student learning in a second work phase.

Target audience This workshop is aimed at laboratory teachers in STEM degree programs. The participants of this workshop should be in charge or a developer of a (digital) laboratory in the STEM field. At least they should have interest in laboratory pedagogy. It does not matter if you are working with a hands-on, virtual reality or a remote laboratory.

Required Equipment: The participants are asked to bring their own laboratory material to the workshop (either printed, digital and/or conceptual knowledge about it).

Workshop Facilitator(s)



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