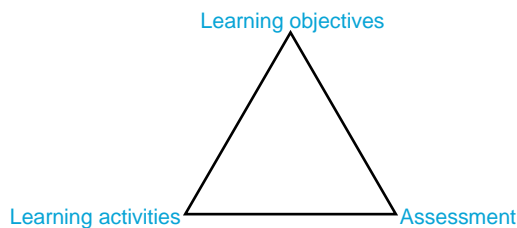


Constructing learning objectives

Constructive alignment

Constructive alignment is at the heart of solid course design (Biggs, 1996; Cohen, 1987).



The first step in designing a well-aligned course is to formulate good learning objectives. These form the cornerstone on which you make decisions for what to include/exclude in your course. They clarify what your students should have learned at the end of your course; what and how to assess; and which teaching and learning methods should be used.

Key conditions of well-formulated learning objectives

Although you have a very strong sense of what a student should learn, it is important to articulate this vision. To make sure that a learning objective is clear, concise and valid, a few steps are key. First, a learning objective should be **student-centred**. To do this, you have to address the students directly:

“By the end of the course, you should be able to...”

Second, we need to determine the tasks that the students should be able to do, and identify cognitive level at which the student should perform that task. Many activities consist of a synthesis of various complex skills.

Complex skills in learning objectives

Writing a paper may involve an intricate combination of various skills, such as identifying arguments, structuring paragraphs, analysing existing text, etc.

Solving a mathematical equation may involve defining the type of problem, identifying and applying the correct mathematical rules, etc.

Third, a clear objective identifies the observable behaviour and using an action verb. Understand, Know, and Learn are non-observable and non-measurable. Ask yourself, once the students understand/know/ have learned something, what can they **do** with it?

“Understand X” could be transformed into “**Describe** X”

Fourth, the desired behaviour relates to a specified **content**. This refers to the content that the student performs with the action verb.

Complex skills in learning objectives

[Justify] the selection of a sensor...

[Develop] a measurement instrument...

Fifth, a well-constructed learning objective specifies the minimum level of achievement required; a so-called **criterion**, which isn't always necessary. For instance: “Students are able to analyse **at least two different discrete time systems**.”

Complex skills in learning objectives

[Analyse] at least two different discrete time systems.

Sixth, ideally a learning objective indicates the circumstances in which students should be able to demonstrate the objective: the **condition/context**. For example:

Complex skills in learning objectives

...using Python..

...under lab conditions.

Last, the learning objective is clear and indisputable. The learning object: “the student is able to draw an **inspiring concept**” is problematic, since the term ‘inspiring’ is vague. An alternative could be: “the student is able to identify weaknesses and strengths of their concept”.

These principles lead to the following list of conditions for well-formulated learning objectives

Conditions of well-formulated learning objectives

The learning objective is **student centred**.

The action verb is based on **observable behaviour**

It is phrased in terms of **action verbs**.

The desired behaviour relates to **specified content**.

The learning objective specifies a **criterion**

It indicates the **condition/context** in which students need to perform an objective.

Here are some examples of well-formulated learning objectives from courses taught at Delft University of Technology:

Examples of well-formulated learning objectives

By the end of this course, you should be able to:

LO1: **Develop** a controller for a simulated process, using MATLAB/Simulink software.

LO2: **Assess** the performance of signal processing and feedback algorithms for their influence on measurement noise and accuracy.

LO3: **Derive** the current distribution and radiated fields of linear dipoles.

References

Cohen, S.A. (1987). 'Instructional alignment: Searching for a magic bullet', Educational Researcher 16(8), 16--20.

Biggs, J. (1996). Enhancing teaching through constructive alignment. *Higher education*, 32(3), 347-364.