Chapter 4: Instructional Engineering
Instructional design: from tradition to engineering

http://www.historicbridges.org/
What should learners be able to do at the end?

- Pedagogical Objectives
- Learning Goals
- Learning Outcomes
What should learners be able to do at the end?

- Reproduction
- Conceptualisation
- Application
- Exploration
- Mobilisation
- Problem solving

Pedagogical Objectives
Instructional design works backwards:

What are they able to do at the beginning?

Pre-Requisites

Pre-Representations

What should learners be able to do at the end?

(which they could not do at the beginning)

Objectives
Mastery learning

Pre-Requisites

Objectives
A map helps to draw (learning) paths?
Content Analysis
(mathetic analysis)
In a right triangle, the square of the hypotenuse is the sum of square of the two other sides.

**A right triangle** is a triangle in which one angle is a right angle.

**A triangle** is a polygon with 3 vertices.

**A polygon** is a plane figure bounded by a finite chain of straight line segments.

**A plane** is a flat two-dimensional surface.

**A line segment** is a part of a line that is bounded by two distinct end points.

**An hypotenuse** is the side of a right triangle opposed to the right angle.

**A right angle** has an amplitude of 90 degrees.

**The vertex** of an angle is the point where two line segments join or meet.

**Content Analysis**

*(semantic analysis)*
Exercise:
Do the content analysis of ‘standard deviation’
Instructional Engineering

Where is instructional design on this continuum?
(1) Specify Objectives

(2) Define pre-requisites

(3) Build the map (content analysis)
Instructional design

(1) Start from:
- Who are the learners (target audience)?
- What should they be able to do at the end of the course?
- How will you know they are able? (*write the exam before the course*)
- Which kind of skill is that? (*taxonomy of cognitive activities*)

(2) Then analyse contents:
- Decompose, disentangle, …
- THINK²: think what students need to think to acquire the concept
- What are the pre-requisites? Are they reasonable for this audience?

(3) Choose the activities, sequence them as a scenario (*NEXT PHASE*)
Pre-Requisites

Objectives

- Pre-prequisite
- Advance Organiser
- Shift representations
- Intrinsic/Extrinsic Representations
- Induction/Deduction
- Proceduralisation/Elicitation
- Transfer