



MU TRAINING WORKSHOP

PEDAGOGICAL CHOICES FOR SKILLS ACQUISITION

MICHÈLE DESENFANT

17-18 May 2022

LABORATOIRE
NATIONAL
DE MÉTROLOGIE
ET D'ESSAIS



Training development process

- Define the main objectives of the training : the skills you want the trainee to acquire (**output level**)
- Identify your audience
 - who is it for ?
 - the necessary **entry level** (ex : no prerequisite, level of statistics, basic knowledge on uncertainty, practice of measurement....)

→ Design the course

Training development process (Example Course LNE-ME13)

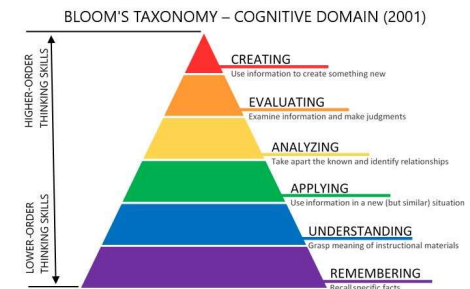
- Define the main objectives of the training :
 - Control and implement the evaluation of measurement uncertainty according to the GUM (JCGM 100)
 - Understand other approaches for the evaluation of measurement uncertainty such as the Monte Carlo method (JCGM 101)
- Identify your audience
 - Who is it for : **Engineers in charge of evaluation of MU**
 - the necessary entry level : *e-learning introduction to MU or equivalent & knowing the mathematical and statistical tools as $\sum \sum$ and $\frac{dy}{dx}$*

SKILLS & PEDAGOGY

- From the main objectives of the training → you build educational sequences

For each sequence :

- Define the targeted skill using for example the **Bloom Taxonomy** (remember, understand, apply, analyse...)
- Choose and Suit the pedagogy of the sequence



SKILLS & PEDAGOGY (EXAMPLE)

- From the main objectives of the training → you build educational sequences (**example LPU**)

Understand the formula of LPU → hypothesis and demonstration of the formula → **slides with formula**

Understand the usefulness of the sensibility coefficients → visual representation of the variation of radius and height of a cylinder → **slides with graphs**

Apply the LPU → **basic exercise**

Discover the relative LPU → **guided exercise**

Analyse the LPU → **practical work on the process of measurement of « g »**

HOW DO YOU CHECK SKILL ACQUISITION

- **After each educational sequence**
- **Or at the end of the training with a Quiz**
- **Or at the beginning and the end of the training**

Scheme of measurement uncertainty process

GUM
GUM S1

Step 3 : uncertainty propagation(LPU, MMC)

Step 1 : Measurement process analysis

Identify
Input quantities

X_i

Develop
Measurement Model

$Y=f(X_1,\dots,X_n)$

Define
Measurand

Y

Step 4 :

Final expression
of result
 $y \pm U$



+ Quiz 20 questions at the end

Thanks for your time !

Questions ?



LNE - Paris



LNE - Trappes