



Design and plan: session, course, materials

ELIXIR-GOBLET Train-the-Trainer - Session 2

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Global Organisation for Bioinformatics
Learning, Education & Training

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ELIXIR-GOBLET Train-the-Trainer – co-lead with Allegra via



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Recap from Session 1

Discussion

Write in the shared notes the reflections you did:

- How do you understand the 6 strategies for effective learning?
- How do you understand the Seven evidence-based learning principles?



[Write in the shared notes for the session 2](#)

By the end of this session, you will be able to:

- Design a mini-training
 - Select Learning Outcomes
 - Identify target audience
 - Draw a concept map
 - Select content
 - Deliver
 - Provide and receive targeted feedback
- (Create a plan from lesson to session)
- (Create a plan from session to full course)

Key:



Shared notes



Break time



Group Activity
(Breakout room)

Learning Outcomes (LOs)



What are Learning Outcomes (?)

Statements expressing which Knowledge, Skills, and Abilities (KSAs) learners will be able to demonstrate upon completion of a learning experience or a sequence of learning experiences

What learners will be able to do, at the end of a lesson that, the teacher (you) can in principle evaluate?

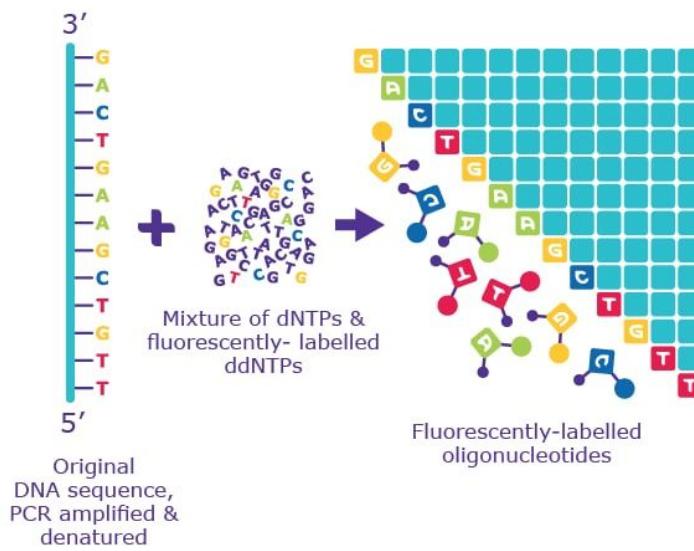
Writing SMARTIE learning outcomes

Specific
Measurable
Achievable
Relevant
Time-limited
Inclusive
Equitable

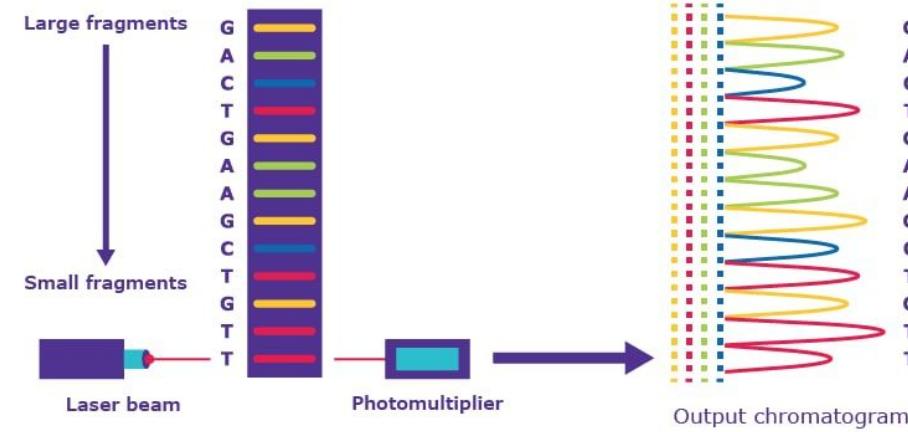
By the end of the course, learners will know DNA sequencing process

How to assess whether learners know the DNA sequencing process?

1 PCR with fluorescent, chain-terminating ddNTPs



2 Size separation by capillary gel electrophoresis



3 Laser excitation & detection by sequencing machine

What do we mean by «knowing» the **DNA Sequencing** process?

- They are able to describe it?
- They are able to explain it?
- They are able to apply it theoretically/practically in a project?
- They are able to demonstrate it?
- They are able to use it in a solving problem?

What do we mean by «knowing» the **DNA Sequencing** process?

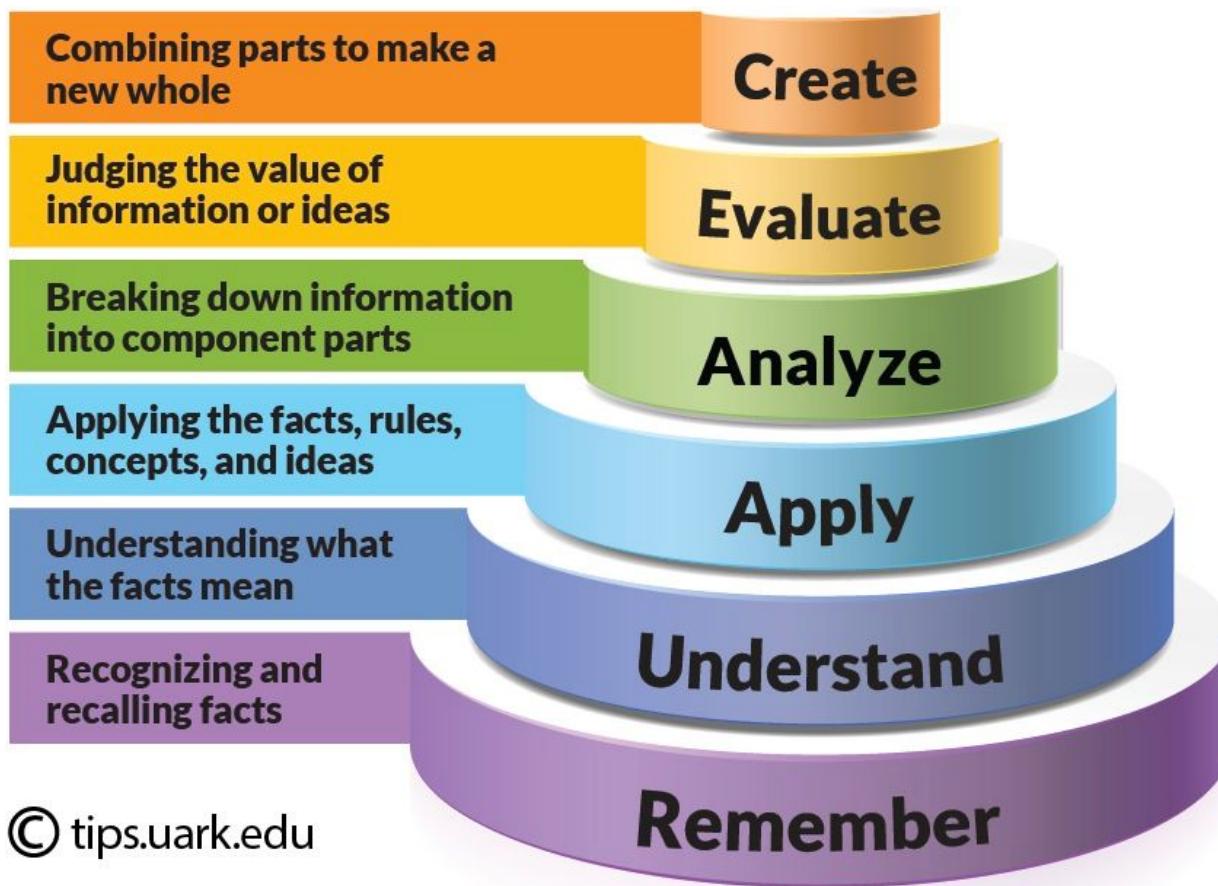
- Are learners able to describe it?
- Or explain it?
- Or apply it?
- Or demonstrate it?
- Or use it in problem solving activities?

It would make more sense to ask:

What will learners be able to do to show they understand **DNA sequencing**?

Bloom's taxonomy & Action verbs

ACTION verbs express levels of cognitive complexity



Develop, Compose, Solve
Assess, Score, Hypothesize
Categorize, Classify, Distinguish
Choose, Calculate, Predict
Discuss, Restate, Explain
Define, Repeat, Recall

Critical thinking

Bloom's Taxonomy & Action verbs

Create

Discuss, conclude, create, develop, formulate, generalize, generate, integrate, modify, plan, propose, design, invent

Evaluate

Evaluate, decide, determine, correct, advise, choose, compare, conclude, criticize, defend, judge, justify, quantify, synthesize

Analyse

Analyse, order, compare, conclude, criticize, diagnose, connect, distinguish, examine, justify, deduce

Apply

Apply, change, choose, demonstrate, calculate, verify, explain how, predict, solve, construct, experiment

Understand

Compare, classify, discuss, distinguish, explain, give examples of, interpret, express, discuss, predict

Remember

Define, describe, list, recognize, connect, write, measure, identify

Writing learning outcomes using ACTION verbs

Think about: what learners will be able to do by the end of a course that I will be able to evaluate

By the end of the course, learners will be able to

.....



Avoid verbs open to multiple interpretations



Use a verb that describes an observable action

Writing learning outcomes (for a learner) using ACTION verbs

Think about: what learners will be able to do by the end of a course that I will be able to evaluate

By the end of the course, you (learners) will be able to

.....
<use a verb that describes an observable action>



Avoid verbs
open to multiple
interpretations

Challenge 2.1 - define the audience, goal and outcomes for a 3' lesson (15 minutes)

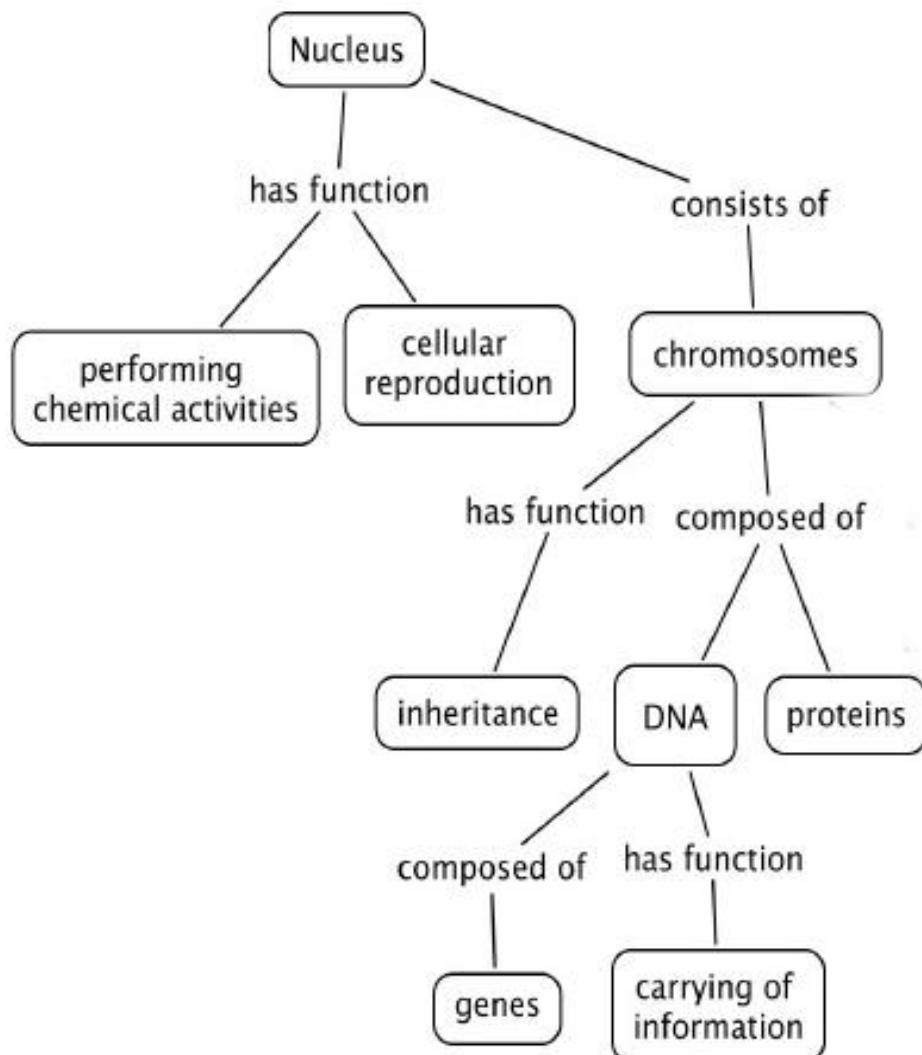
- 1. Choose a topic**
- 2. Define teaching objectives** (describe your goals and intentions as the instructor)
- 3. Write learning outcomes** (think about what learners will be able to do by the end of this instruction) - using Bloom's taxonomy - actionable verbs
- 4. Identify the target audience and prerequisites**
- 5. Identify the learning experiences**
- 6. Start thinking about the content - but don't spend time in preparing this yet**



Challenge 2.1 - Let's see



Defining content with Concept Maps



- 9 nodes
- 6 edges
- Total: 15 concepts

Concept maps – how to use the tool

- Concept maps are graphical tools for organizing and representing knowledge
- Include concepts and relationships to link concepts
- Good to start a concept map with a focus question - context
- Help to organize knowledge and to structure it
- Good concept maps are built with iterations and feedback
- Concept of mapping: invented by Joseph D. Novak , 1972

Further reading - [The Theory Underlying Concept Maps and How to Construct and Use Them](#)

BREAK (5 min)



Challenge 2.2 - Draw a concept map for you mini lesson (15')

Draw a concept map of your topic of interest, start with a question

- Include 7 (+ - 2) concepts
- Include relationships and cross-links between these concepts
- Arrange it in a hierarchical structure with the key concepts on top



Use shared notes for this activity

Challenge 2.2 - Let's see





Challenge 2.3 - Feedback on concept maps (10')

In pairs, exchange concept maps. No need to explain the map.

- Write one thing you are confused; what you are not sure about the map?
- Write one thing you like; what is clear about the map?

Each person will give and receive two feedbacks:

Positive and Constructive on content

Challenge 2.3 - Let's see



Content

- **Content collection**

Appropriate content to the needs and capabilities of your target audience

- **Content reduction**

One of the biggest challenges in designing training courses is the reduction of content to the training format. **Key points!**

Challenge 2.4/2.5 - Produce the content and the training material for your mini lesson (15')

It's now time to prepare the content of your mini-training

The structure of your mini-training should be something like:

- 20 seconds **introduction**
- 2:20 minutes on **topic**
- 20 seconds **conclusion**

Use your concept map and adapt as needed

BREAK (15 min)



Discussions / feedback - How to give and receive feedback

- Listen actively and attentively
- Ask for clarification if you are confused
- Do not interrupt one another
- Challenge one another, but do so respectfully
- Critique ideas, not people
- Do not offer opinions without a supporting evidence
- Take responsibility for the quality of the discussion
- Build on one another 's comments; work toward shared understanding.
- Do not monopolise discussion.
- Speak from your own experience, without generalizing.
- If you are offended by anything said during discussion, acknowledge it immediately.



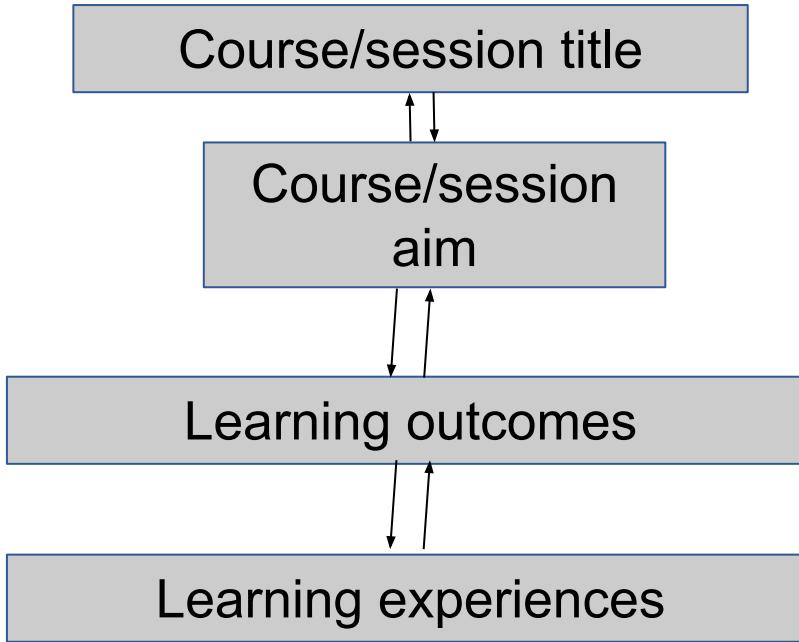
Challenge 2.6 - Deliver mini-training (12')

Split into groups of 2 - breakout rooms

1. Each will deliver their 3 minute session to the others
 - One person delivers the session
 - One person notes down feedback in real-time
2. You describe your own feedback (self-feedback) on your delivery
3. The other provides feedback to the presenter
4. Then rotate within the group (and restart from 1)

Summary of LOs: Learning outcomes should map to learning experiences, aims and titles

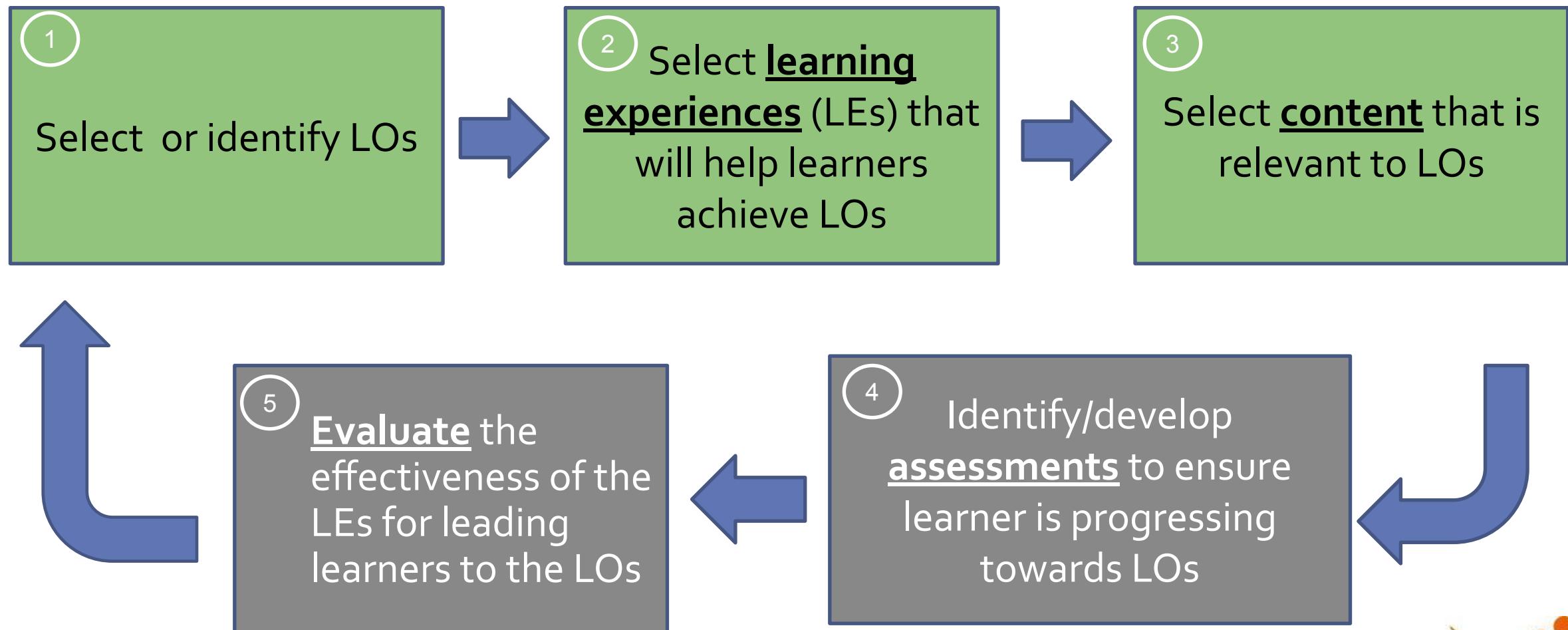
- Learning outcomes should start with verbs
 - e.g. List, Design, Write script
- Learning activities should allow outcomes to be achieved
- Example of verb “List” - knowledge domain, bottom of Bloom’s taxonomy
 - Activity should involve listing, remembering, choosing correct answers, etc.



From learning outcomes to a lesson/session/course outline

- Well-defined and well-written LO will guide the whole structure
- Learning outcomes (LO): knowledge, skills and abilities (KSA) that learners will be able to demonstrate after instruction
- Learning experiences (LE): lectures, scripts, exercises, a game, a video, group work, ...
- Assessment and feedback tools: creative activities, written tests, observation, interaction, forms,...
- LO, LE, Assessment should be tightly-linked
- When all the LOs are expanded, you have your course outline

Instruction design in five steps



Lesson/session/course plan

Time	Activity	Description	Goal

Example: Plan for a 1 hour 15 session

Time	Activity	Description	Goal/Outcome
9.00-9.15	warm-up	Learners summarise the key points of each session from the previous day and answer questions from the audience. The instructor describes the plan of the day in detail.	Retrieval from memory, repetition, get prepared for new topics, expose learners
9.15-9.25	lecture	Python functions	Learning to write a function, about function input and output, and how to call a function.
9.20-10.00	practical activity	Two exercises to be solved in pairs on a single computer. After solving the first exercise, the "driver" and the "navigator" will swap. Two learners (one per exercise) will display their solutions to the audience. Questions and discussion.	Learners will be able to write and call a function calculating the distance between two points in the 3D space and a function taking the base and height of a triangle as input and returning its area.
10.00-10.15	wrap-up	Group test on functions (match input and output with specific functions; fill gaps in pieces of code). Game: repetition using ball throwing.	Assess learning. Do we need to work more on functions? Repeat meaning and usage of all Python objects introduced so far.



Wrapping up

Think about recap for session 2:

1. one thing that you understood and feel you can put into practice
2. one thing you are not sure of and would need more clarification in.

Kindly fill out minute card: <https://forms.gle/3jZQjny7c1erBYfw8>

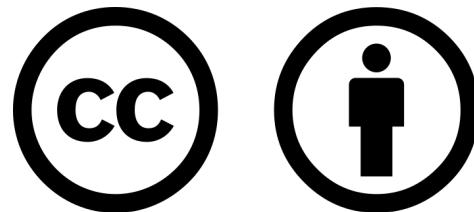


Thank you!

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Time to relax!



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