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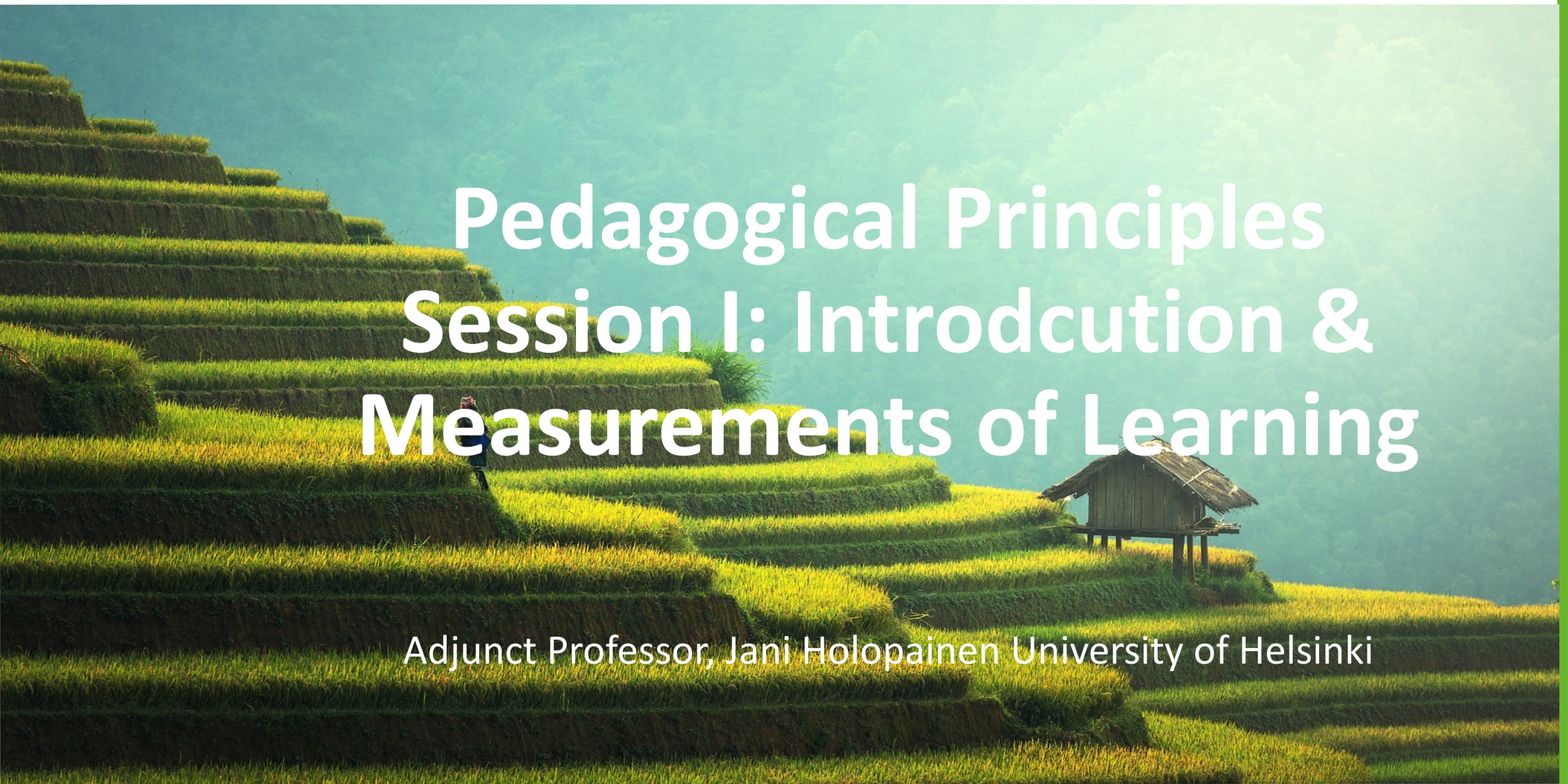

Pedagogical Principles
Session I: Introdcution & Measurements of Learning

Adjunct Professor, Jani Holopainen University of Helsinki

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Pesonal facts

Jani Holopainen

- Adjunct Professor, University of Helsinki, Forest Sciences
- Postdoc, University of Jyväskylä, Design Research
- ~ 30 publications out of which around half pedagogical studies
- R&D focus on combination and optimization of traditional teaching methods, online courses and Mixed Reality techs

Pedagogical trainings

Team University of Helsinki provides three trainings in support of course implementations:

1) Pedagogical principles (online lectures and assignments 10 hours, Jani)

- Synchronous online lectures and assignments on topics such as e.g. **direct and indirect measurements of learning, 21st century skills, constructive alignment (objectives, contents, methods, evaluations), design thinking**

Training dates and time: 17th August, 2021 (2-4pm Thai/Lao time), 25th August, 2021 (2-4pm Thai/Lao time) and 31st of August, 2021 (2-4pm Thai/Lao time)

Pedagogical trainings

2) MOOC training (online lectures and implementation assignments 35 hours, Antti)

- **Design and implemention**

3) Virtual Reality training (face-to-face lectures and implementation assignments 25 hours, Jani & Antti)

- **Design and implemention**

Outline for the Session 1 (today’s):

- Pedagogical Principles –training's:
  - Objectives
  - Contents
  - Methods
  - Evaluation
- Direct and indirect measurements of learning
- 21st Century Skills
- Breakout rooms to describe course design elements for your courses (homework assignment)

Overall objectives

At the end of trainings (all three), a trainee will be able to:

1. Remember and understand the pedagocial principles
2. Apply the pedagocial principles in the development of MOOCs and Virtual Reality courses
3. Create courses based on the pedagogical models and principles

Overall contents

1st session:

- **(Introduction)**
- **Direct and indirect measurements of learning**
- **21st century skills**

2nd session:

- **Constructive alignment: courses objectives, -contents, -methods, -evaluations**

3rd session:

- **Design thinking**

Overall methods

- 3 sessions with introductory to pedagogical principles / theories / models / methods
  - After a joint introductory, assignments in small groups (breakout rooms)
  - After some online sessions also some homework assignments
  - Each session 2 hours

Evaluation

- Applied in the end of all 3 trainings (towards the end of the FRAME –project)
- Peer-to-peer evaluations on the course objectives:

1. Remember and understand the pedagocial principles
2. Apply the pedagocial principles in the development of MOOCs and Virtual Reality courses
3. Create courses based on the pedagogical models and principles

- Use an Evaluation Matrix (final score = average of all three objectives):

Evaluation Matrix:

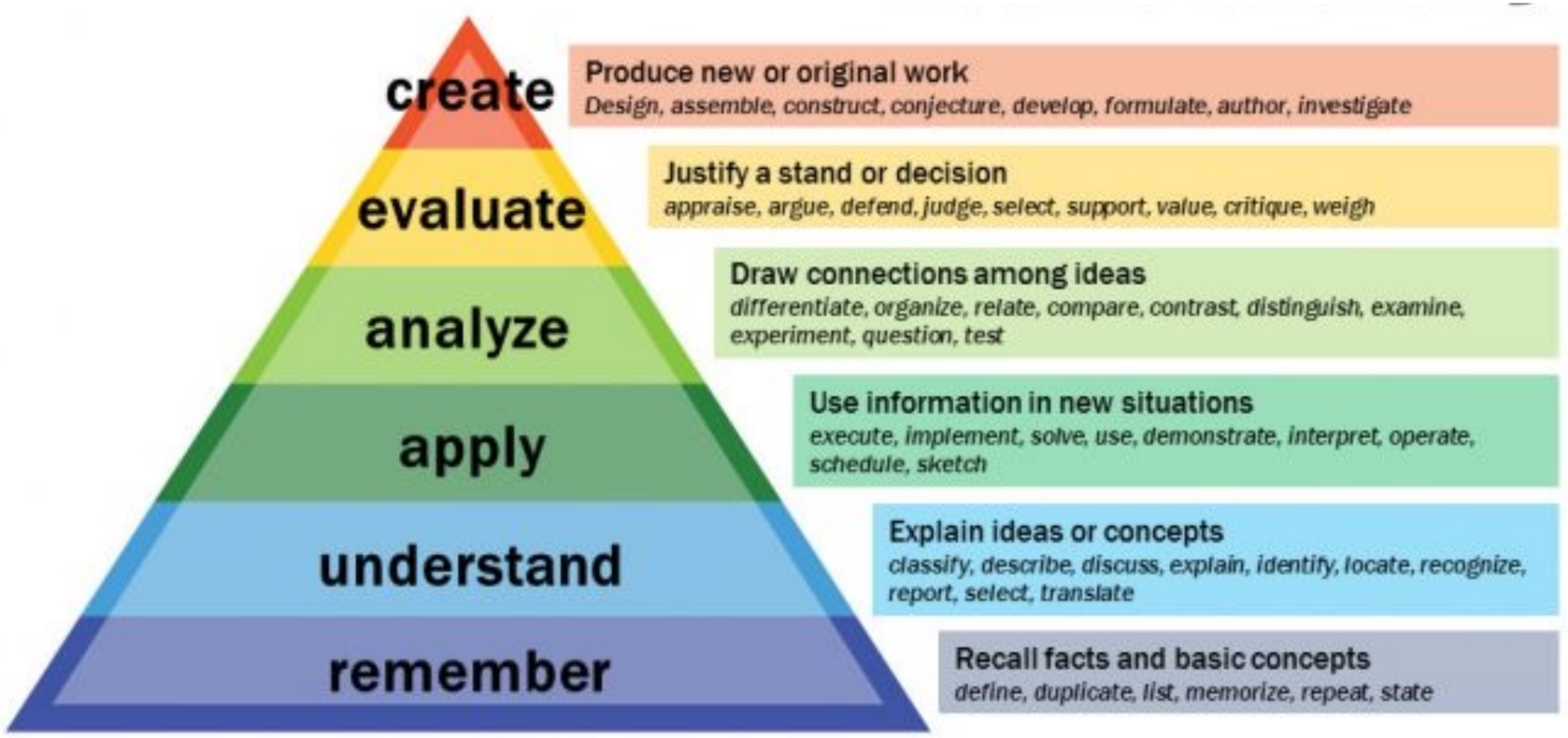
Objective # / Score	1	2	3	4	5
1.	Able to list and explain 1/4 of course contents	Able to list and explain 2/4 of course contents	Able to list and explain 3/4 of course contents	Able to list and explain 4/4 of course contents	Able to list and explain all course contents exceptionally well
2.	Able to use 1/4 course contents in course designs	Able to use 2/4 course contents in course designs	Able to use 3/4 course contents in course designs	Able to use 4/4 course contents in course designs	Able to use all course contents in course designs exceptionally well
3.	Giving examples on course designs where 1/4 of course contents occur	Giving examples on course designs where 2/4 of course contents occur	Giving examples on course designs where 3/4 of course contents occur	Giving examples on course designs where 4/4 of course contents occur	Giving examples on course designs where all course contents occur exceptionally well

Note that 1-4 are course contents: measurements of learning, 21st century skills, constructive alignment, design thinking

In Breakout rooms have a 10 min talk about this training’s design elements: objectives, contents, methods and evaluation

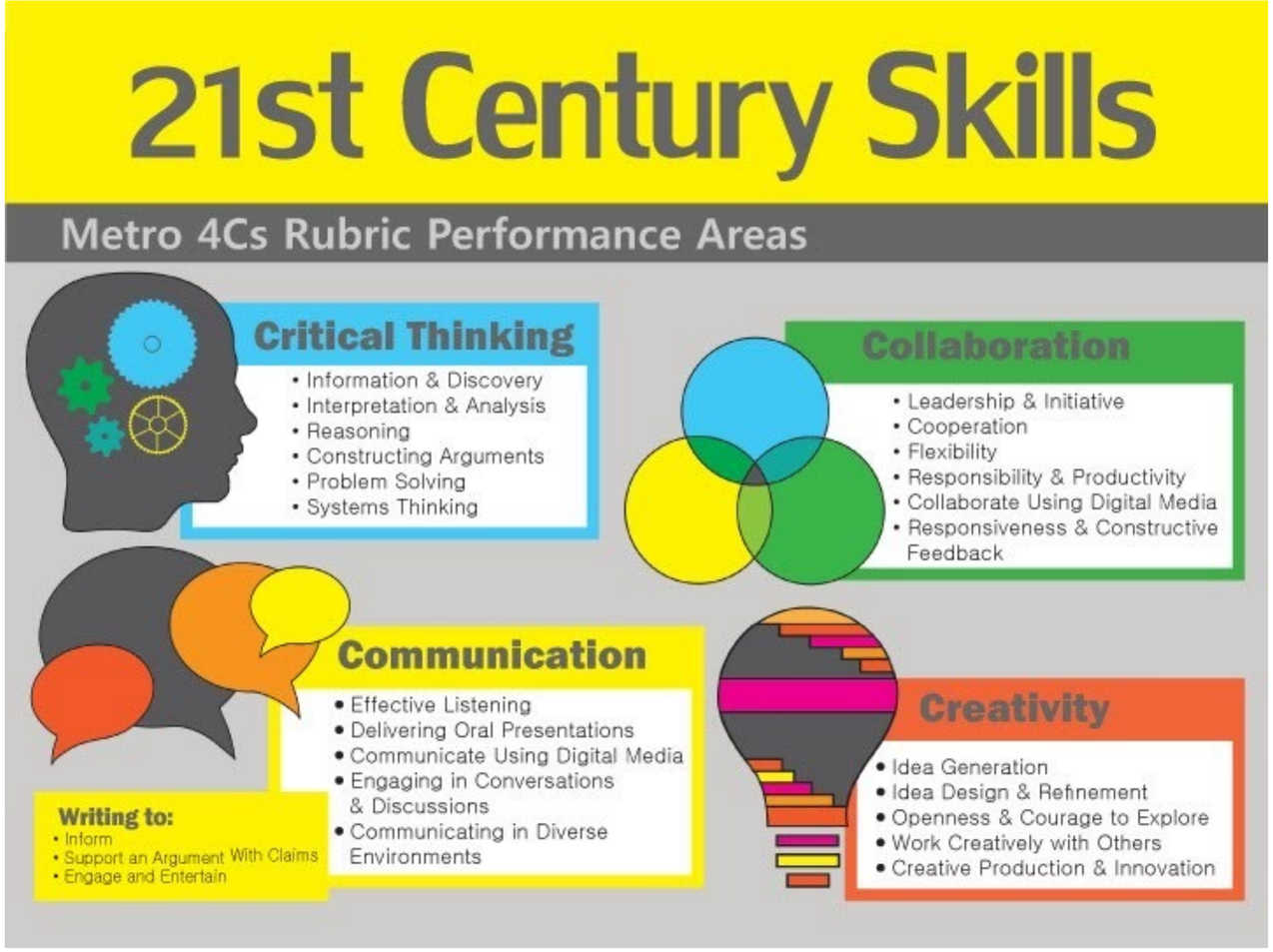
Direct measurements of learning

- Bloom's taxonomy (Anderson et al. 2001) is a tool to create course objectives as well as evaluation matrix i.e. direct measurements of learning outcomes (Holopainen et al. 2020)



Indirect measurements of learning

- Indirect learning outcomes, such as 21st Century Skills, are those that are achieved through methods (Holopainen et al. 2021):



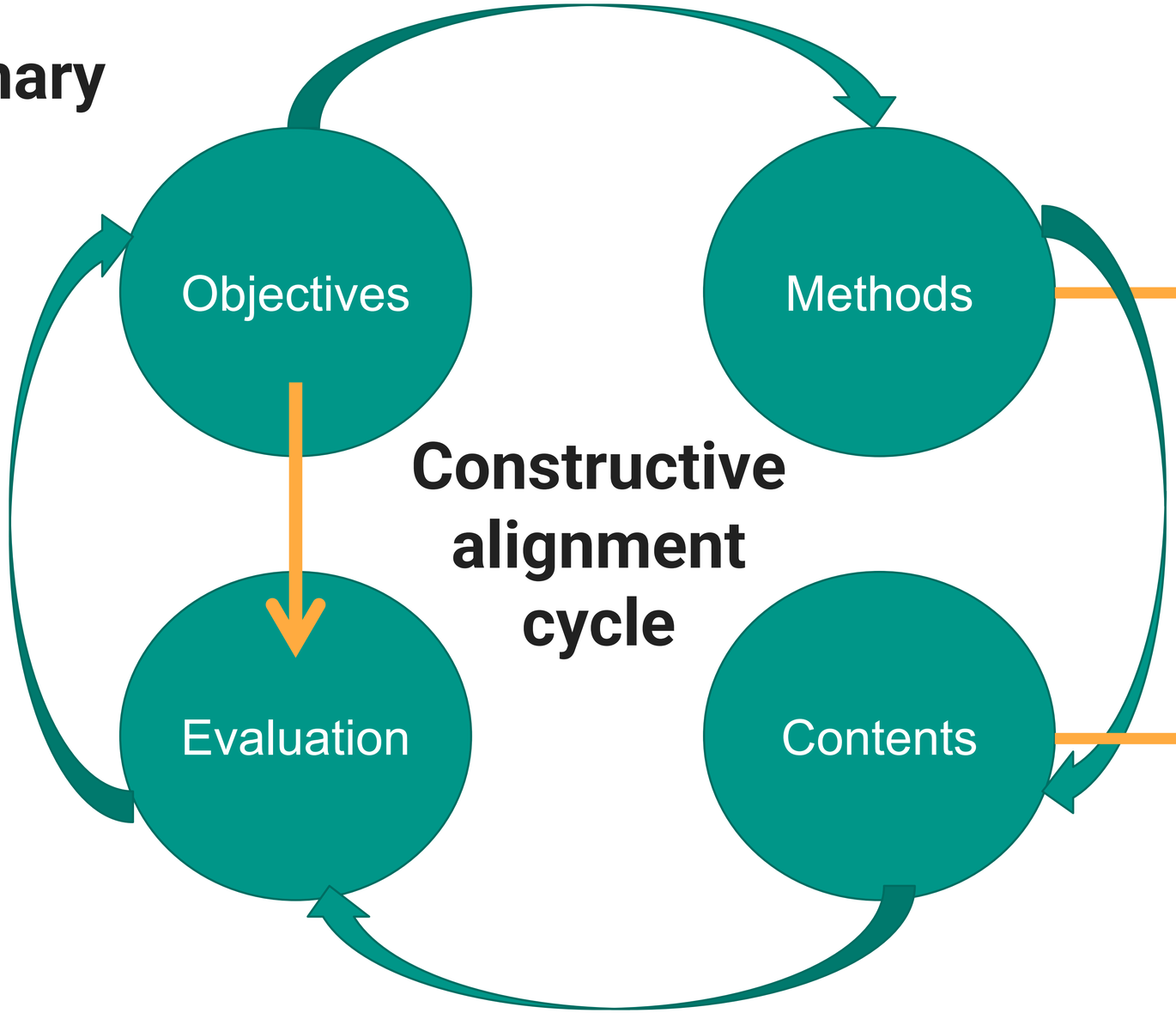
Indirect measurements of learning

Another set of indirect learning outcomes include:

- Motivation
- Flow
- Presence
- Immersion
- Self-determination (i.e. autonomy, competence, relatedness)
- Engagement

Course content play a major role delivering these indirect outcomes (further contributing to direct learning outcomes) (Lähtevänoja et al. 2021):

Summary



21st Century Skills

Motivation
Flow
Presence
Immersion
Self-determination (i.e. autonomy, competence, relatedness)
Engagement

Direct learning outcomes according to Bloom's taxonomy

Individually or in groups: for the next time take an example course of yours (FRAME –project course / some old course / some imaginary course). Daft basic elements for the course design: objectives, contents, methods, evaluation. (Just a draft is enough as we start to develop and iterate the design together!)

Rerferences

- Anderson LW, Krathwohl DR, Airasian PW, et al. A taxonomy for learning, teaching, and assessing: A revision of bloom’s taxonomy of educational objectives, abridged edition. White Plains, NY: Longman. 2001.
- Biggs J. Enhancing teaching through constructive alignment. Higher education. 1996;32(3):347-364.
- Holopainen, J., Lähtevänoja, A. J., Mattila, O., Södervik, I., Pöyry, E., & Parvinen, P. (2020). Exploring the Learning Outcomes with Various Technologies: Proposing Design Principles for Virtual Reality Learning Environments. In *Proceedings of the 53rd Annual Hawaii International Conference on* System Sciences. University of Hawaii.
- Holopainen, J., Lähtevänoja, A., Sandström, N., Nevgi, A., Mattila, O., Pöyry, E., & Parvinen, P. (2021). Applying Affordances Scale as a Design Method: Case Virtual Reality Course Design. In Proceedings of the Annual Hawaii International Conference on System Sciences. University of Hawai'i at Manoa.
- Lähtevänoja et al. 2021 ?!?

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Pedagogical Principles Session 2: Constructive Alingment

Adjunct Professor, Jani Holopainen University of Helsinki

In Breakout rooms list and explain the direct and indirect measurments of learning (same assingment as in the Evaluation Matrix): 10 minutes!

Evaluation Matrix:

Objective # / Score	1	2	3	4	5
1.	Able to list and explain 1/4 of course contents	Able to list and explain 2/4 of course contents	Able to list and explain 3/4 of course contents	Able to list and explain 4/4 of course contents	Able to list and explain all course contents exceptionally well
2.	Able to use 1/4 course contents in course designs	Able to use 2/4 course contents in course designs	Able to use 3/4 course contents in course designs	Able to use 4/4 course contents in course designs	Able to use all course contents in course designs exceptionally well
3.	Giving examples on course designs where 1/4 of course contents occur	Giving examples on course designs where 2/4 of course contents occur	Giving examples on course designs where 3/4 of course contents occur	Giving examples on course designs where 4/4 of course contents occur	Giving examples on course designs where all course contents occur exceptionally well

Note that 1-4 are course contents: measurements of learning, 21st century skills, constructive alignment, design thinking

Outline for the Session 2:

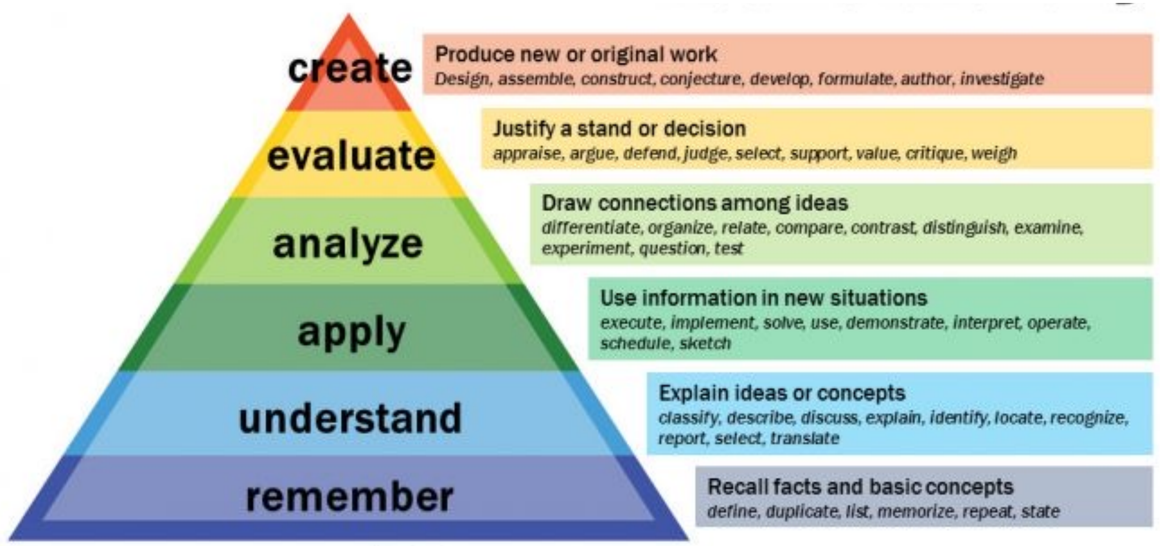
- Constructive alignment – How to design course:
  - Objectives
  - Contents
  - Methods
  - Evaluation
- Breakout rooms to redesign / iterate you own course design elements (homework assignment)

Constructive alingment – How to design objectives?

At the end of training, a trainee / student will be able to (example objectives from this training):

1. Remember and understand the pedagocial principles
2. Apply the pedagocial principles in the development of MOOCs and Virtual Reality courses
3. Create courses based on the pedagogical models and principles

1. To start use this kind of sentence



2. For each objective pick verbs from Bloom's taxonomy

Constructive alingment – How to design contents?

Souphanouvong University, Laos
Newly developed courses:
Forest Restoration
Tropical Forest and climate change
Analysis of Environmental Impact
Sustainable agriculture and livelihood
Political Economy of Development and Livelihoods
Sustainable natural resource management and Marketing
Ecotourism and Rural Development
Updated courses
Environmental Pollution
Recreation Impact
Environmental impact assessment of tourism
Geography Information System (GIS)
Wildlife Management
Sustainable NTFP management and Marketing (MOOC)
Water resource management
Biodiversity conservation
Forest resource economics
Agroforestry
Silviculture
Communication environment
Participatory of Ecotourism

Constructive alingment – How to design contents?

Savannakeht University
New course
Advanced Kiln Drying
Economic Valuation of Forestry Resources
Dendrology
Woody analysis
Woody Chemistry
Woody Characteristics
Wood-Industrial Machines (Forestry Machines, Logging)
Technology of Wood Processing (Shawn Wood, Furniture, Glue Stick, Baked Wood, and Paper Production)
Technology of Woody Protection
Labour Management in Factory of Wood Processing
Wood Utilization and Management
Updated courses
Forestry Ecology
Forestry Plantation
Non-Timber Forest Products Management
Agroforestry

Constructive alingment – How to design contents?

Chiang Mai University, Thailand
Newly Developed course
Forest restoration science and research
Principles and Practice of Restoring Tropical Forest Ecosystems – MOOC
Updated courses
Restoration Ecology

Kasetsart University
Newly developed courses
Social Aspects for Sustainable Forest Resource Management in the Tropics
Potential Professional Training course on Lidar Application and Modern Forest Technologies for SFM

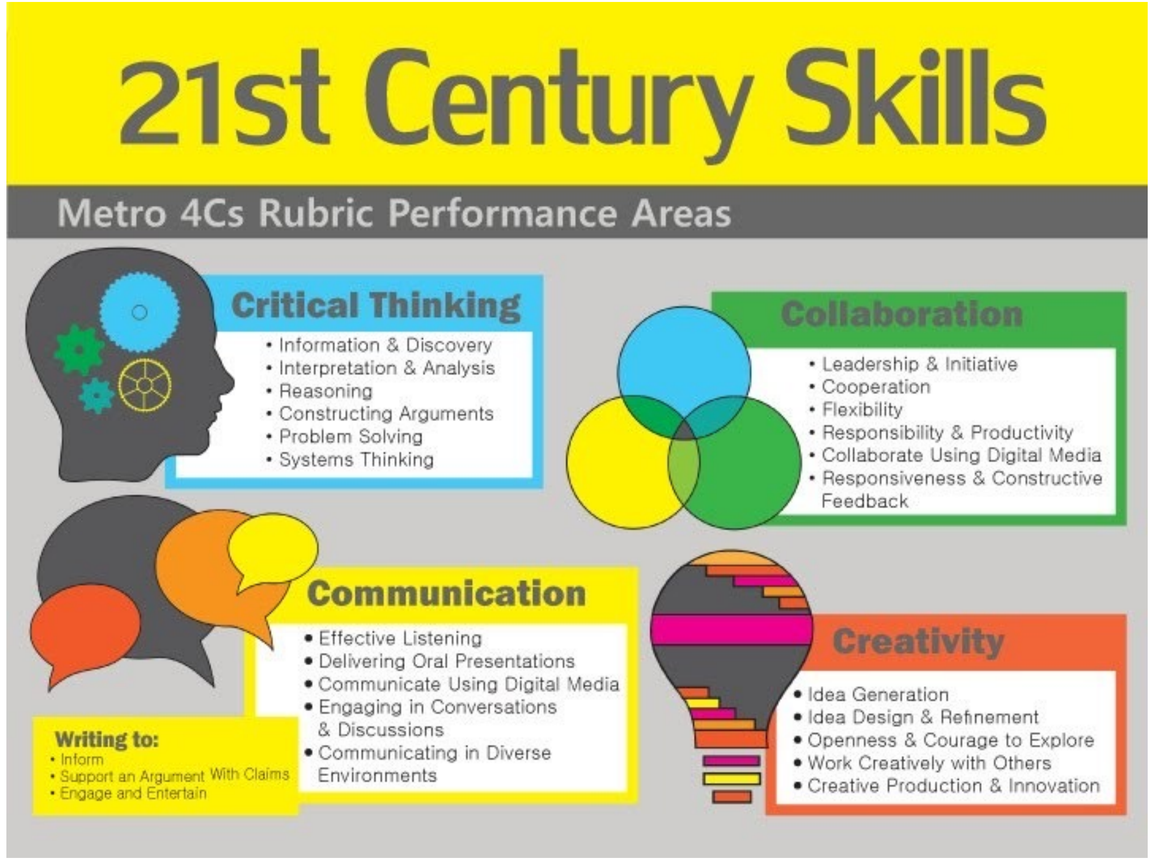
Updated course
Integrated Knowledge for Sustainable Forest Resource Management
Professional Experiences in Silviculture: From Concept to practice
Mapping Technology in Forestry
Logging Systems
Application Programming in Forestry

Constructive alingment – How to design contents?

- Each primary topic should include 5-15 sub-topics
- Introduction (introducing course objectives, contents, methods, evaluation)
- For each course sub-topics:
  - Context photos / 360-photos / 360-videos
  - Keywords
  - Definitions of keywords with references

Constructive alingment – How to design methods?

- A complete list of teaching methods: https://onlinedegrees.sandiego.edu/complete-list-teaching-methods/
- Choose a variate of teaching methods to develope students' 21st Century Skills
- Example methods from UH VITRI's course: visuals and readings, multiple choice questions by a teacher, multiple choice questions and answers by peers



Constructive alingment – How to design evaluation?

(example evaluation matrix from this training)

Objective # / Score	1	2	3	4	5
1.	Able to list and explain 1/4 of course contents	Able to list and explain 2/4 of course contents	Able to list and explain 3/4 of course contents	Able to list and explain 4/4 of course contents	Able to list and explain all course contents exceptionally well
2.	Able to use course contents in course designs	Able to use 2/4 course contents in course designs	Able to use 3/4 course contents in course designs	Able to use course contents in course designs	Able to use all course contents in course designs exceptionally
3.	Giving examples on course designs where 1/4 of course contents occur	Giving examples on course designs where 2/4 of course contents occur	Giving examples on course designs where 3/4 of course contents occur	Giving examples on course designs where 4/4 of course contents occur	Giving examples on course designs where all course contents occur exceptionally well

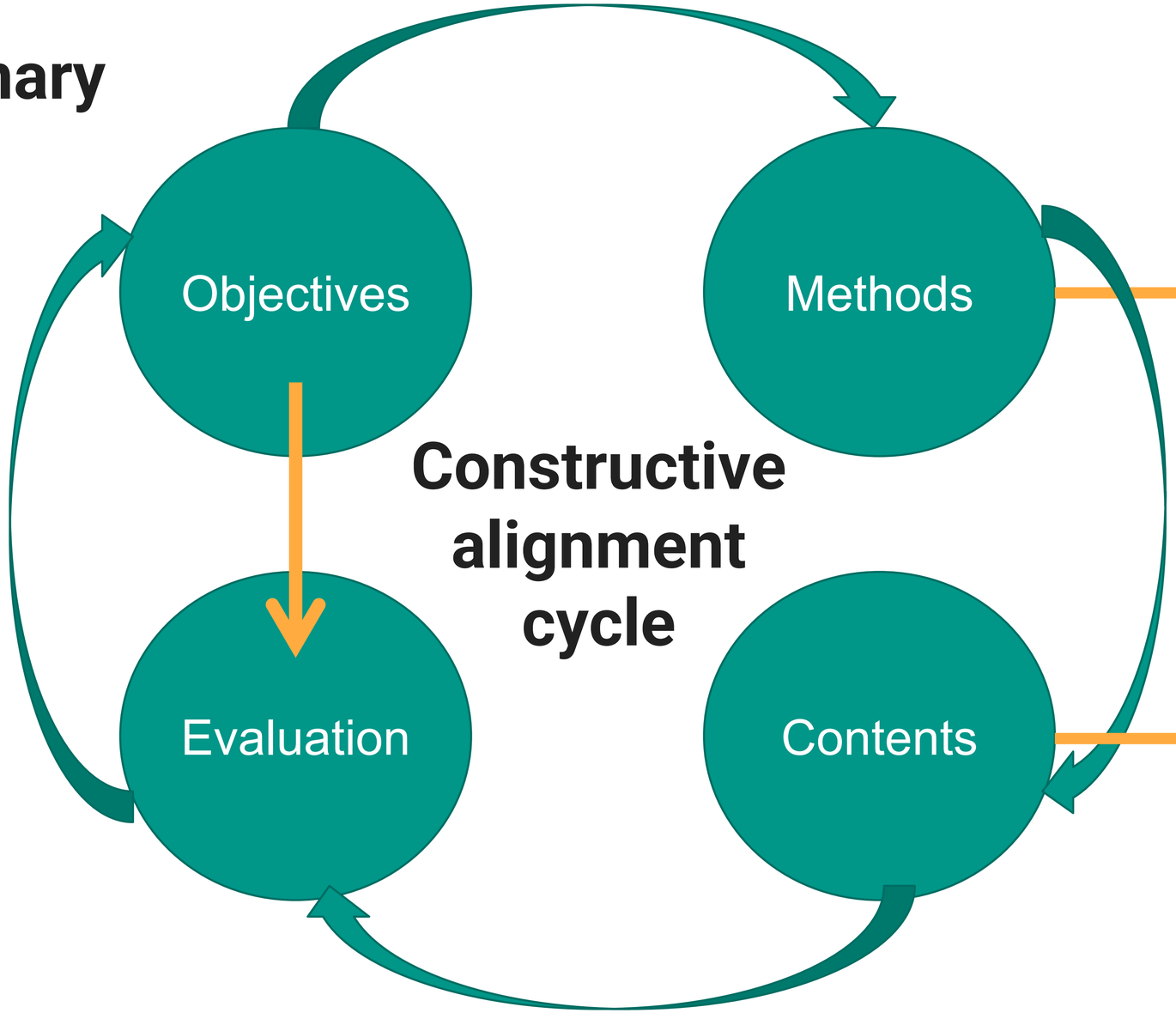
1. Each course objective on rows

2. Use Bloom's taxonomy and words

3. Try to be quantitative (helps evaluation work)

Note that 1-4 are course contents: measurements of learning, 21st century skills, constructive alignment, design thinking

Summary



21st Century Skills

Motivation
Flow
Presence
Immersion
Self-determination (i.e. autonomy, competence, relatedness)
Engagement

Direct learning outcomes according to Bloom's taxonomy

In Breakout rooms considering the homework: iterate / redesign the course design elements (objectives, contents, methods, evaluation) based on today’s introduction. Iterations and redesigns are in the hearth of design thinking which is the next session’s topic!

Rerferences

- Anderson LW, Krathwohl DR, Airasian PW, et al. A taxonomy for learning, teaching, and assessing: A revision of bloom’s taxonomy of educational objectives, abridged edition. White Plains, NY: Longman. 2001.
- Biggs J. Enhancing teaching through constructive alignment. Higher education. 1996;32(3):347-364.
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- Lähtevänoja et al. 2021 ?!?

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Pedagogical Principles
Session 3: Design Thinking

Adjunct Professor, Jani Holopainen University of Helsinki

In Breakout rooms give a short introduction about your course design elements (objectives, contents, methods, evaluation). 10 min!

Outline for the Session 3:

- Storyboarding
- Course syllabus
- Design thinking –model
- Testing
- Next steps

MOOC design storyboard

Moodle will be used as a platform to create the MOOC courses. As Moodle is open source, there will be no additional costs.

Teacher

Teacher creates a course with Moodle Mooc platform. In the course **introduction** teacher defines course objectives, contents, methods and course evaluation.

In the second section teacher creates a **discussion forum** for students to address questions and answers. Third section is the **first section with substance**.

In the beginning of each section with substance teacher makes a description about the **360 photo / 360 video / 3d object**. Next, teacher introduces and defines all the **keywords** and **references** related to the environment / object.

After that, the 360 photo / 360 video / 3d object environment is attached to the section followed by **multiple choice question(s)** by the teacher. Each substance section is concluded with a discussion forum where students post multiple choice question themselves and answers each other's questions.

Student

Student **joins to the course** created by the teacher (using a self-registration method).

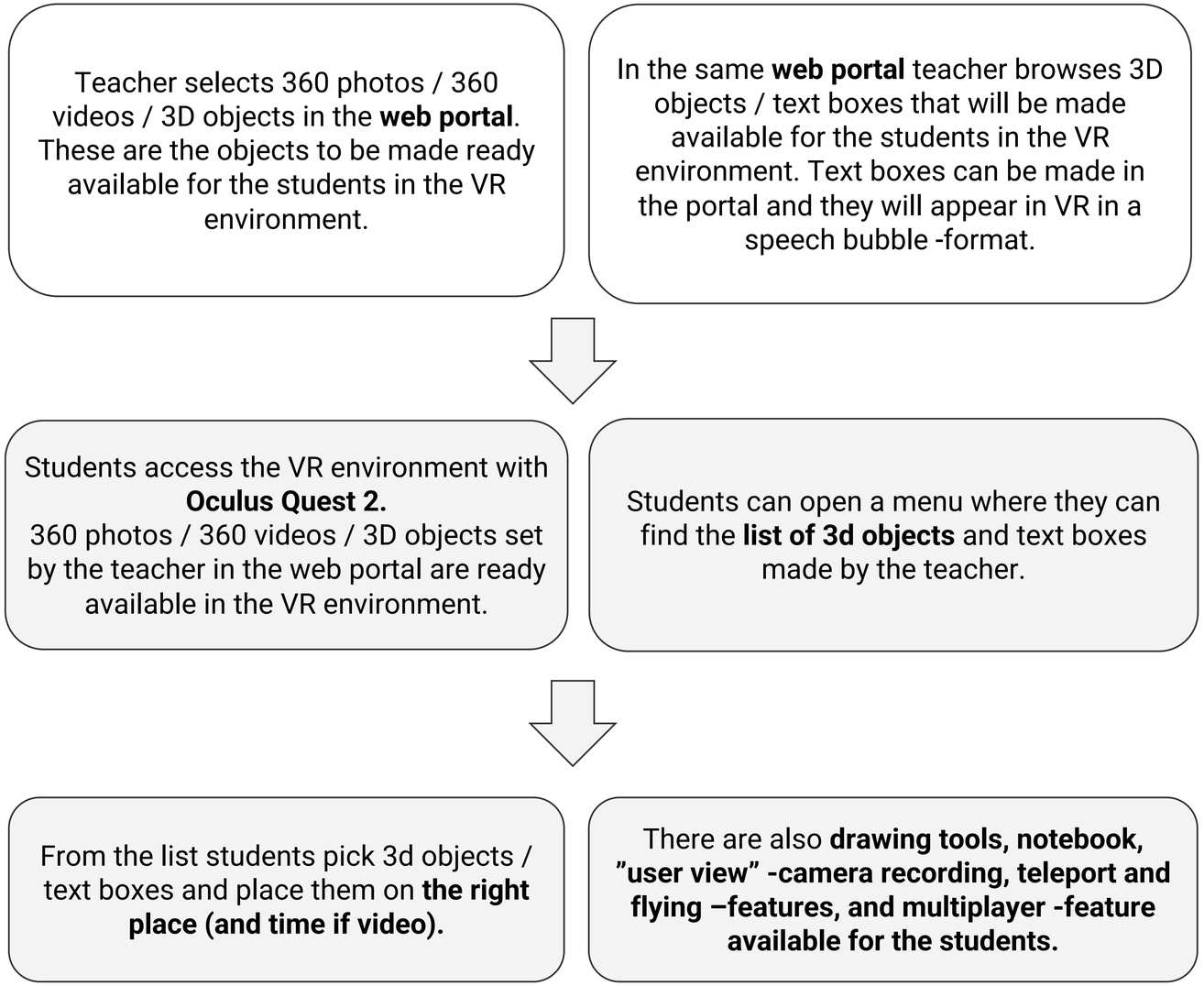
Student **familiarizes** him/herself about the description of the 360 photo/ 360 video/ 3D object and related keywords and references.

Student does the tasks associated to the 360 photo/ 360 video/ 3D models. Tasks include ready-made (by the teacher) **multiple choice questions, multiple choice questions made by other students and creation of student's own question**.

Virtual Reality design storyboard

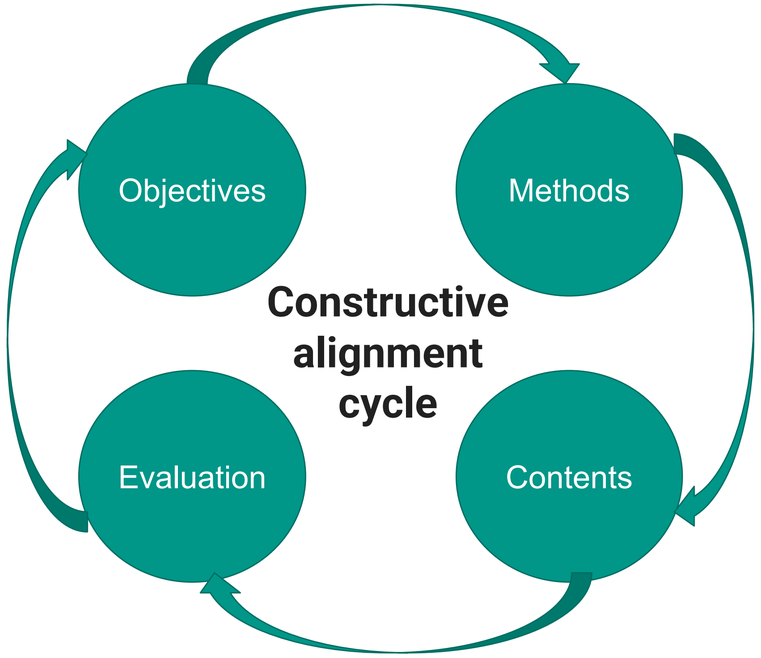
The Virtual Reality (VR) learning environment enables students to attach attributes (3d objects or text boxes) to a context (360 photos / videos / 3d objects). This enables students to **combine theories and practices**, i.e. learning-by-doing.

The VR learning environment design is applicable to all courses under development e.g. social aspect of tropical forestry, lidar – technology trainings, sustainable forest management, silviculture, forestry mapping, introduction of logging and other system applications.



Describe a storyboard for your course. 20 min in breakout rooms.

Constructive Alingment + Storyboarding → Course Syllabus



+

Teacher selects 360 photos / 360 videos / 3D objects in the **web portal**. These are the objects to be made ready available for the students in the VR environment.

In the same **web portal** teacher browses 3D objects / text boxes that will be made available for the students in the VR environment. Text boxes can be made in the portal and they will appear in VR in a speech bubble -format.

Students access the VR environment with **Oculus Quest 2.**
360 photos / 360 videos / 3D objects set by the teacher in the web portal are ready available in the VR environment.

Students can open a menu where they can find the **list of 3d objects** and text boxes made by the teacher.

From the list students pick 3d objects / text boxes and place them on **the right place (and time if video).**

There are also **drawing tools, notebook, "user view" -camera recording, teleport and flying –features, and multiplayer -feature available for the students.**

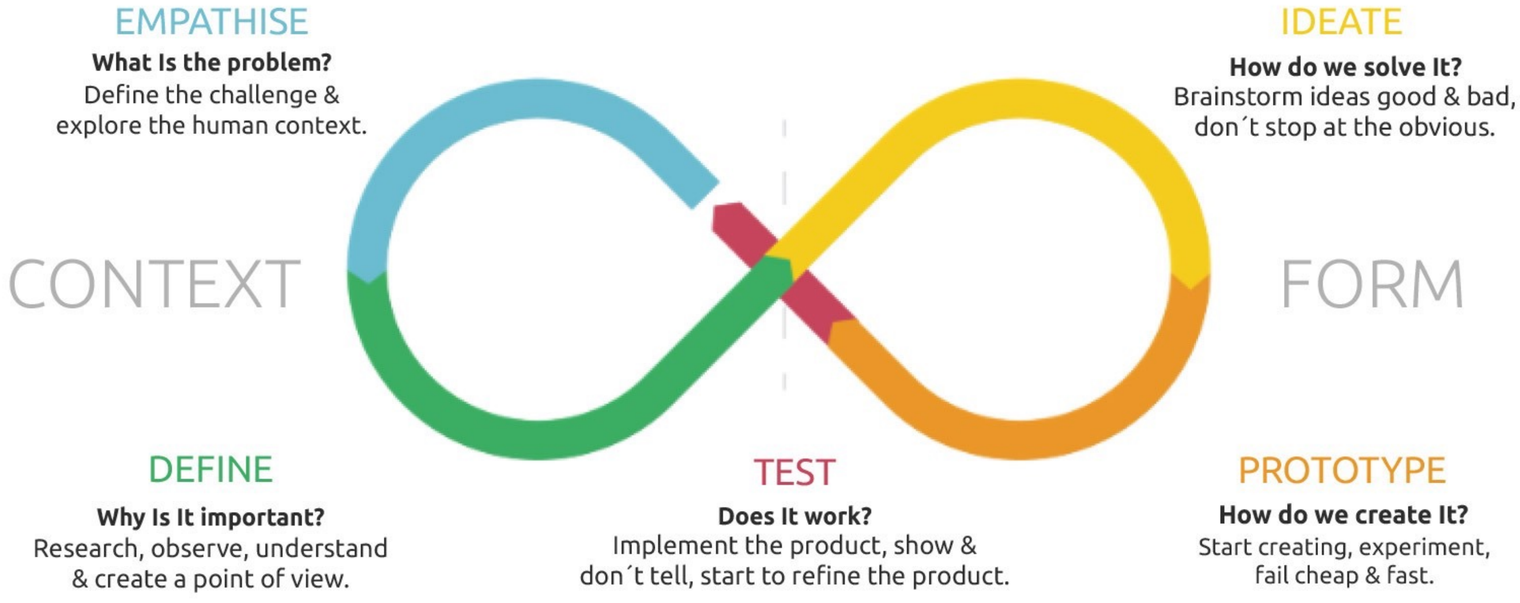
→

Course Syllabus: Detailed description of the course process including objectives, contents, methods, evaluation

Design thinking –model

1. Constructive alignment

2. Storyboarding



3. Course syllabus

- Problem – Solution centricity
- Customer centricity
- Innovative
- Fail fast and learn fast –mentality

4. Testing: where, what, how?

Testing: where, what, how?

- Where?
- On a course
- Inside other courses
- Exhibitions and fairs

- What?
- Direct learning measurements
- Indirect learning measurements
- 21st Century Skills

- How?
- Assingments during the course (formative evaluations)
- Exams (summative evaluations)
- Surveys
- Experiments
- Interviews
- Observations
- Course feedback forms

Describe Testing for your course:
where, what, how?
20 min in breakout rooms.

Next steps: Prepare a course syllabus and a testing plan. Those are the documents for the next training sessions (MOOCs with Antti).