

# Global co-creation of learning resources towards improved quality: Possibility or Utopia?

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## Three words of warning!

➤ *All about energy (mainly mechanical)*

➤ *Mainly MSc*

➤ **Nothing about ChatGBT**

*Will we need any educator-to-educator collaboration at all?*

*General thoughts*

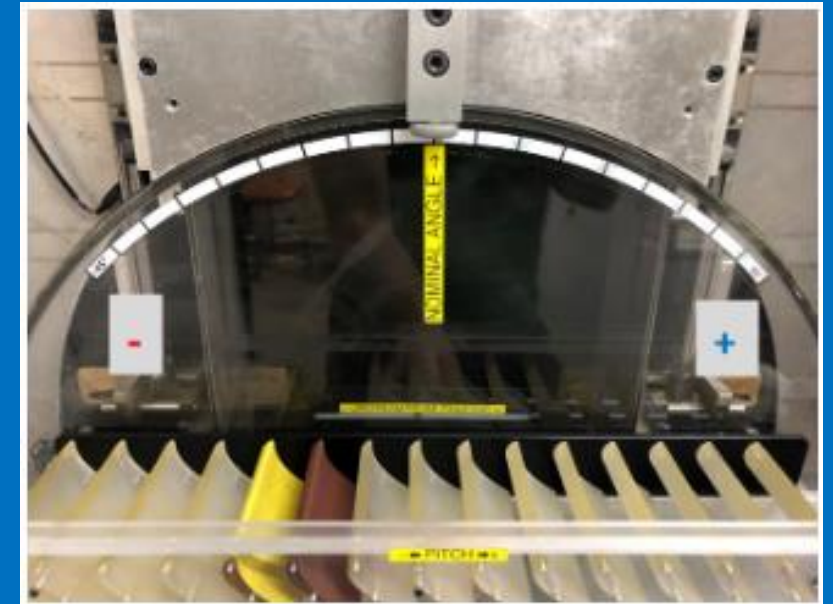
*Teaching vs Learning*

*Is MOOC “the solution”?*

*Is “remote” gaining speed?*

*Collaborate on education: Suggestion*

- As researchers we collaborate internationally with our peers in different ways
  - ✓ Of course: High competition on our home turf!
- Collaboration is recognized as giving higher quality
- Peer review is essential for publication
- Collaboration increases chances for citations and thus personal ranking
  - ✓ Promotion depends upon it?
- University rankings depend upon larger groups



- Do educators collaborate internationally with our peers in different ways?
  - ✓ *No competition at all on our home turf?*
- Is collaboration recognized as giving higher quality?
- How do we perform peer review?
- Collaboration *should* increase chances for citations and thus personal ranking
  - ✓ *Does promotion depend upon it?*
- Does university ranking depend on education?



## Polling (show of hands)

- Have you had your journal/conference articles peer reviewed during the last 3 years?
- Have you yourself reviewed such articles during the 3 last years?
- Has your educational material (down to “lecture level”) been peer reviewed during the 3 last years?
- Have you yourself peer reviewed educational material from someone else the last 3 years?



- Teachers teach
- Learners learn
- How much “teaching” do we need today?
- What exactly is “teaching”?
- Is it not more guidance and mentoring that is needed today??



- Remote learning in the sense of "off-campus" has always taken place
- It seems tough to have a "less value" than on-campus
- Why is this, and can remote become equal?

*If the "Learning in the workplace" is 70% why do we as teachers then put all our resources on the 10%?*



## Before Covid19: Remote was a “no-no”:

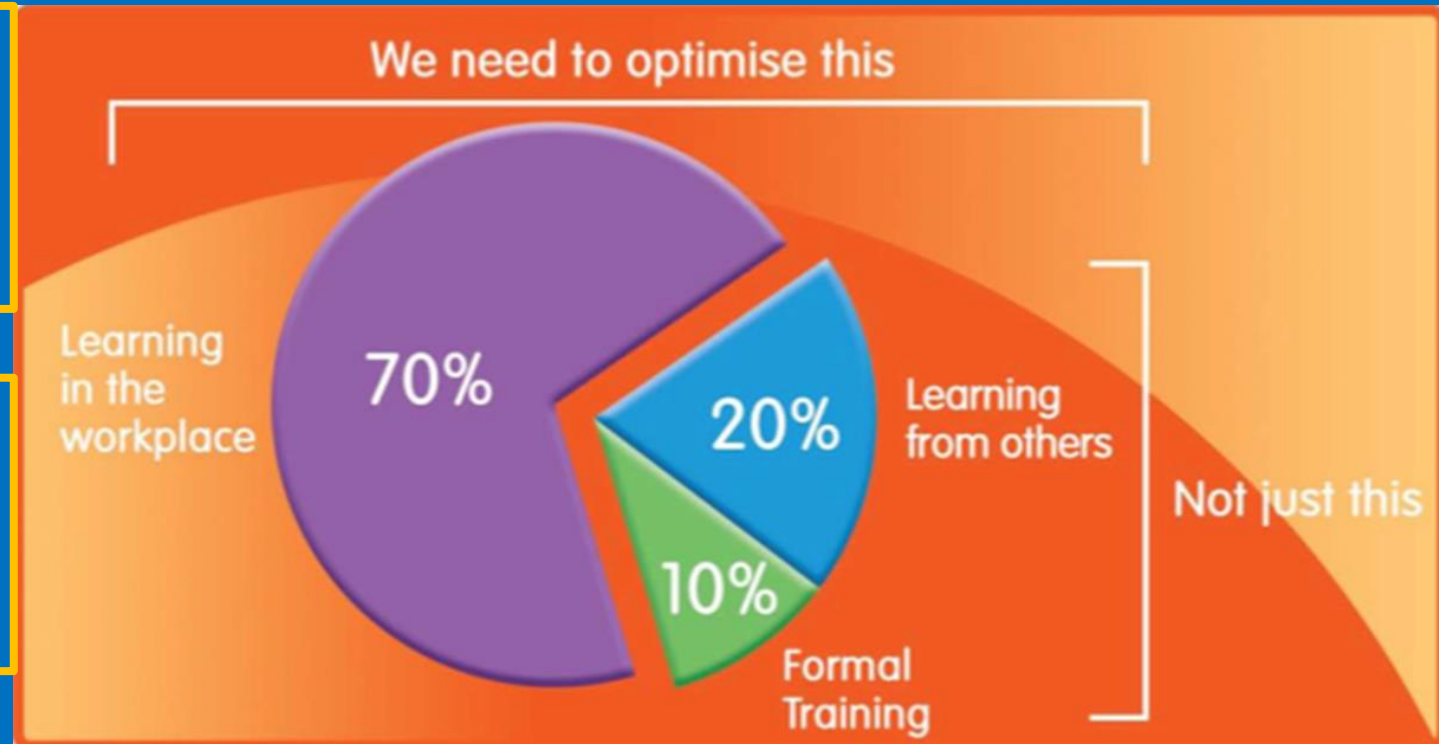
- ✓ Labs: “Will never give equal value”
- ✓ Teaching: “I must see my students in the eyes”

## After Covid19:

- ✓ Labs: Can help a lot
- ✓ Teaching: Zoom, Teams, .....

## But do we do “remote” correctly?

- ✓ Is not focus too much on teaching?
- ✓ Is a “Zoom lecture” good enough?



Let us go back 935 years, to 1088 in Bologna:  
Reading in the library



The Smithsonian Book of Books;  
Michael Olmert, 1992

# And going to class



00:34

# Do we still need this?



# Focus on learning, not teaching

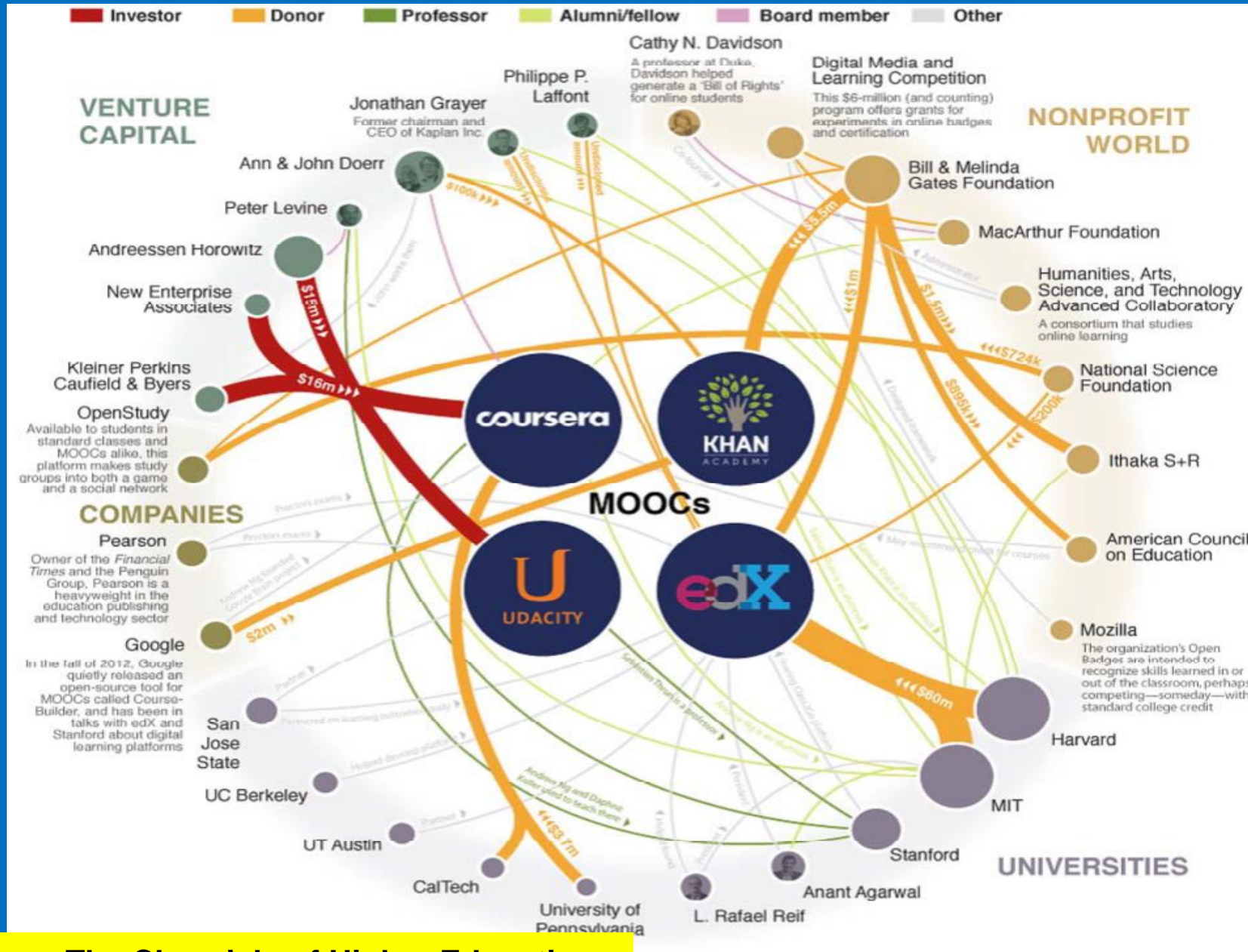


- **Self-paced**
- **Any where**
- **Any time**
- **Just in time**
- **Collect knowledge (and points as assessments)**
- **ILO & ALO**
- **How to get creativity into “not physical meetings”?**
- **How to create remote collaboration?**

Education is a ***BIG*** market!

Will BigTech enter the market?  
With AI?

# Major Players in the MOOC Universe



Source: The Chronicle of Higher Education

# Is a MOOC-platform the solution for the future? (Ex: Coursera)

- MOOC=Massive Open Online Course

- Offered by:

- Coursera

- EdX

- UdaCity

- Kahn Academy

- FutureLearn

- Diversity

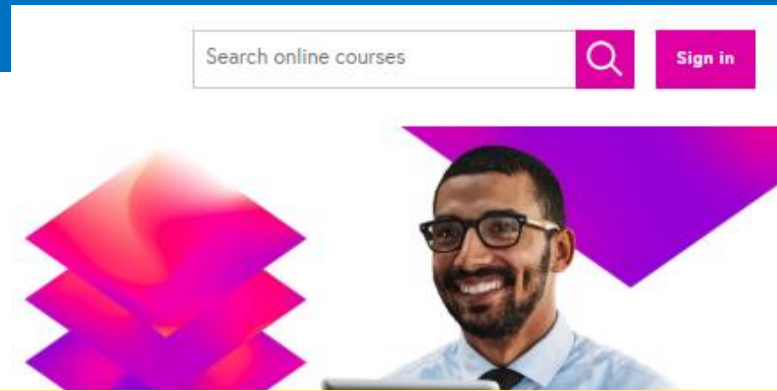
- ...

Is this a threat to universities?

The screenshot shows the Coursera website interface. At the top, there is a search bar with the text "What do you want to learn?". Below the search bar is a "Top Rated Courses" section. A category menu is open, listing various fields of study. The category "Degrees and Professional Certificates" is circled in red. A red arrow points from the text "Is this a threat to universities?" to this circled category. The "Top Rated Courses" section lists several courses, including "Algorithms, Part II" by Princeton University, "Brand New Brand" by California Institute of the Arts, "Programming Languages, Part B" by University of Washington, and "Programming Languages, Part A".

## Microcredentials and programs

Microcredentials and programs allow you to pursue further study in a specialised field. Microcredentials are accredited qualifications created by leading universities for you to build professional skills relevant to your career. Programs allow you to deepen your understanding of a subject, with the opportunity to earn a professional or academic credential.



### Common Micro-Credentials Framework:

- EQF 6-7
- 100-150 Learning Hours

### Microcredentials **3 MICROCREDENTIALS**

Our online microcredentials are designed to upskill you for work in rapidly-growing industries, without the time and cost commitment of a full degree. You can earn academic credit to use towards a degree or they can be used as an independent certification. Each microcredential includes a formal online assessment and meets the standards set by the Common Microcredential Framework (CMF).



The Open University endorsed by Cisco  
Networking Academy

**Cyber Security Operations**  
(Cisco)



The Open University

**Global Development in Practice:  
Designing an Intervention**



The Open University

**Teacher Training: Embedding  
Mental Health in the Curriculum**

## What might be the next step?

*Although these allow for some individual choices, all seems to be fairly traditional?*

- Only distribution mechanism changes?
- One organization delivers “everything”?
- How is the cost set?
  - ✓ ~650€ for 10 UK credits => ~15'000 € for a 2 year (120 ECTS) MSc.
  - ✓ How much compared to an on-campus program?
- Is this affordable in emerging economies?
- What about collaboration for better educational experiences?
- How are “local conditions” taken into consideration?

➤ **What might be the next step?**

# Libraries of videos, simulations and labs (much less in non-electricity than in electricity)

➤ Most universities probably have a library of remote labs (since Covid19), videos etc

- ✓ Often directed towards their own students
- ✓ Often difficult to run for the "non-specialist"

➤ Some open:

➤ Example Carnegie Mellon ([Chemistry](#))

➤ Aristotle University

The image shows two mobile application interfaces. The left interface is 'AeroEngines', featuring sections for 'Quick Calculations' (Atmospheric Properties Calculator, Great Circle Distance Calculator), 'Engine Performance' (Aeroengine at Design Point, Hybrid Rocket Engine at Design Point, Ramjet Engine at Design Point, High Speed Afterburning Turboramjet), and 'Extra Characteristics' (Aircraft Emissions on Cruise & LTO modes). The right interface is 'VTA-APP', showing a 'Turbine' section with 'Hub', 'Mid', 'Tip', and 'Comp' tabs, a 'Triangles Comparison' graph, and 'Stator mean camber lines'.

The screenshot displays the 'TURBOLABs: FLUTTER LAB - KTH - EGI - HPT' web interface. It includes a header with the KTH logo and session information (Online - Clients: 0 - 2023/03/01 11:06:42 UTC). The interface is divided into several control panels: 'Patm, kPa' (102.13) and 'Temp, °K' (293.23); 'Mach N.' (0.00) and 'Flutter Ind.'; 'Fan Frequency 10-35Hz' (12 Hz) with 'Start' and 'Stop' buttons; 'Cascade Rotation 0-45°' (25°) with a 'Ready' indicator and 'Home' button; 'Spring Length 10-100%' (35.0%) with a 'Ready' indicator and 'Home' button. A 'Measurement' section shows 'Ready' status and 'Steady' mode. A 'Camera #1 Lab rig General view' is visible, showing a physical turbine rig. At the bottom, five gauges show 'Blade displacement, °' for Blade +2 (-0.488), Blade +1 (-0.292), Blade 0 (-0.180), Blade -1 (0.355), and Blade -2 (-0.565).

Picture: KTH/E

# Two more examples of labs

West Attica university:  
Users from 63 countries

## Labsland



**LABS, EQUIPMENT AND SERVICES**

**1. Access to Laboratories**

- 1- Digital electronics**
  - FPGA
  - Intel DE2-115
  - Intel DE1-SoC
  - Digital Trainer
  - Boole Designer
  - STM32 Nucleo
- 2- Robotics & Tech**
  - Arduino Robot
  - Basic Arduino
  - 3D Printer
- 3- General electronics**
  - Electronics
  - AC Electronics
  - Common circuits
- 4- Physics**
  - Kinematics
  - Radioactivity
  - Archimedes
  - Pendulum
  - Spring
  - Advanced buoyancy
  - Optics
  - Boyle's Law
  - Electronics
  - AC Electronics
  - Snell's Law
  - Conservation of Momentum
  - Free Fall
- 5- Engineering & Instrumentation**
  - Luxometer
  - Sonometer
  - Thermographic Camera
  - Centrifugal Pump
  - Pelton Turbine
  - Texture Analyser
  - Flowloop
- 6- Chemistry**
  - Gay-Lussac's Law
  - Boyle's Law
  - Acid-Base titration (v1)
  - Acid-Base titration (v2)
  - Diffusion
  - Exchangeable Acidity of Soils
  - Water Heating and Cooling Curves
- 7- Biology**
  - Planarians

**2. Remote Laboratory Hardware**

- Arduino Robot
- Arduino Board
- Intel DE1-SoC
- Intel DE2-115
- ST Nucleo WB55RG
- TIVA Launchpad with tm4c129
- Analog Electronics Lab

**3. Additional Services**

- Creation of real-time labs
- Creation of ultraconcurrent labs

# Shift Gear

Let us consider **collaboration** in education

- Teachers **share** basic educational material
- Teachers **re-use** basic educational material (????? NIH-syndrome?????)
- Teachers **collaborate** to improve basic educational material and to create **common courses**
- Teachers **collaborate** towards establishing (common or not) not-for-profit **degree-awarding programs** (academic, professional).
- *Students **prepare themselves before class.***
- *Students **establish themselves their "missions" and personal learning journeys***

*Can this be imagined?*

✓ **If so, what about quality and peer reviews?**

# Words from colleagues about “collaboration in education”

- **Global interaction, networking, multicultural**
- **Platform to share and better one’s academic standing**
- **Development of high-quality learning materials out of the collaboration**
- **Shared experiences results in better approaches and presentations**
- **Quality Improvement Process promotes continuous improvement towards high quality learning materials**
- **Developed materials for student-centred pedagogy can be very useful complementary learning materials during online learning**
- **Certification at multiple levels can be a source of continuous motivation for the learner.**
- **Collaborative**
- **Innovative in the area of online + active learning**
- **Promoting UN Sustainable Development Goals**

# Educator to Educator Collaboration?

Let's go down to nitty gritty details

*An example of my personal opinion of  
how we could collaborate*



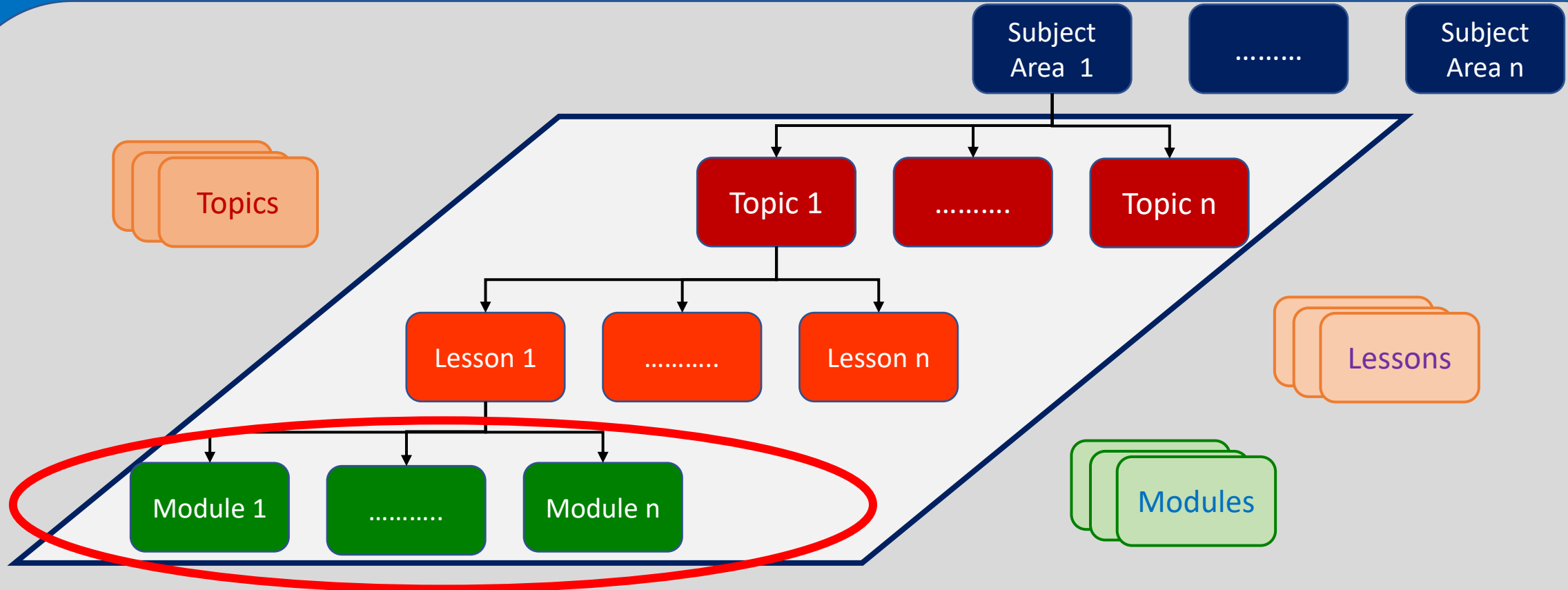
**The Energy Educators Global Knowledge-  
network**

- EXPLORE Energy Digital Academy -

## Structure of Learning Content:

### Material comes from different sources globally:

- Some teachers (or group of teachers) provide educational material in a complete “Subject area”
- **Some teachers provide material in a complete “Topic”**
- **Some teachers provide material only in a complete “Lesson”**
- **And some teachers provide material corresponding to only individual modules**

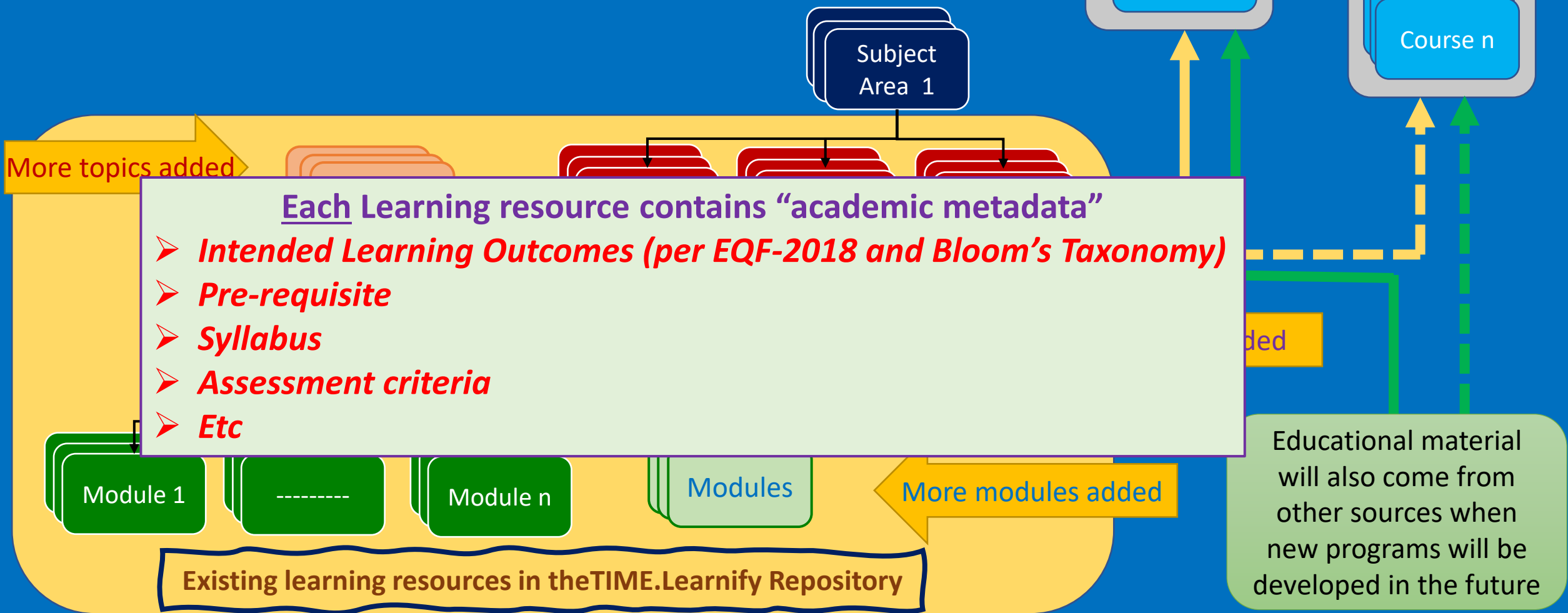


### Every content in the repository is called a “Learning Resource”:

- Independent upon if it is a “Subject area”, a **“Topic”**, a **“Lesson”** or a **“Module”**

Academic and Professional Programs select appropriate Learning Resources from the pool of existing **Topics/Lessons/Modules** and adds in the process more material to the repository.

➤ *In this process the pool of existing material grows.*



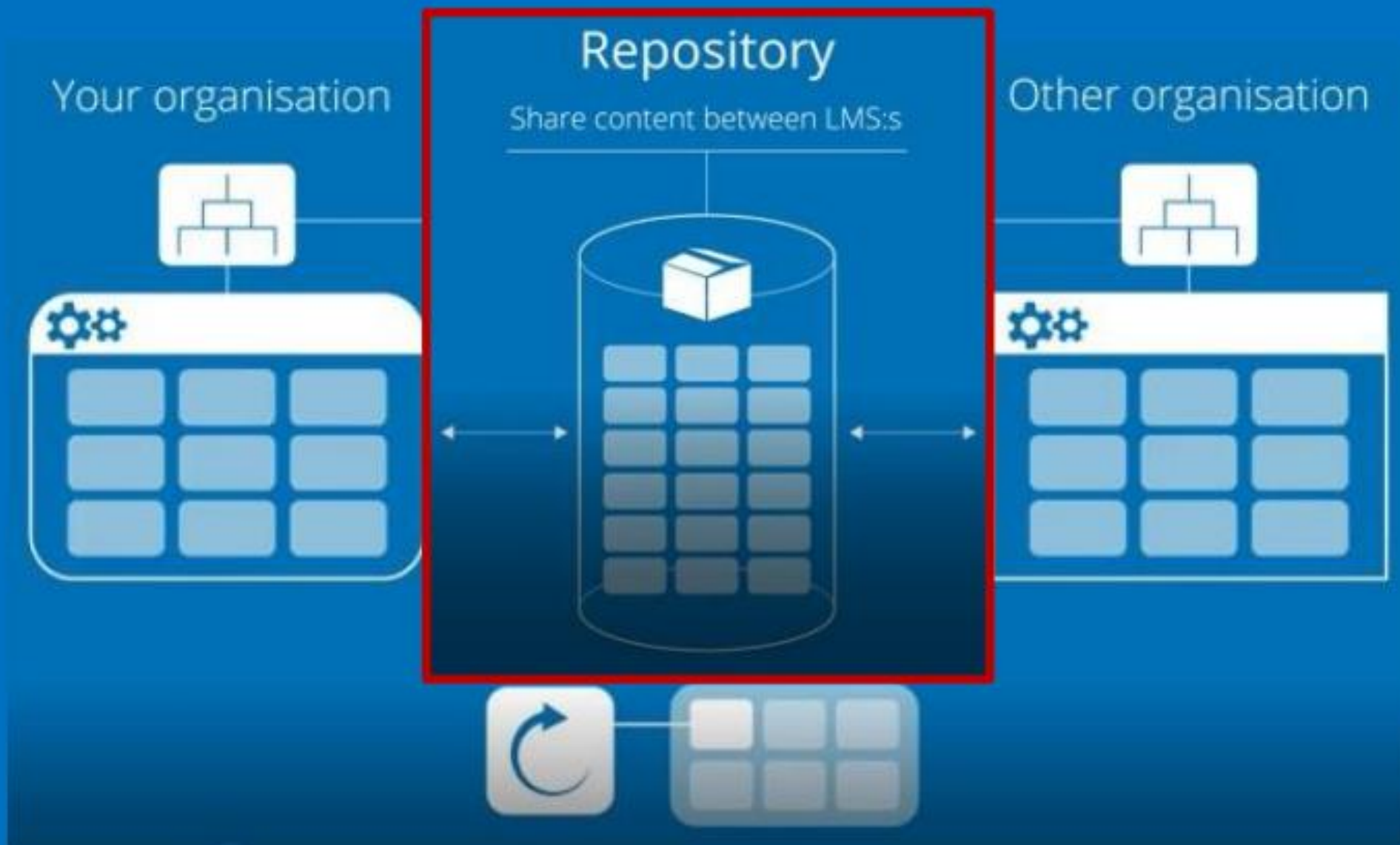
Educational material will also come from other sources when new programs will be developed in the future

# Example of small Learning Resources (=Modules [Max 5 ELH] each)

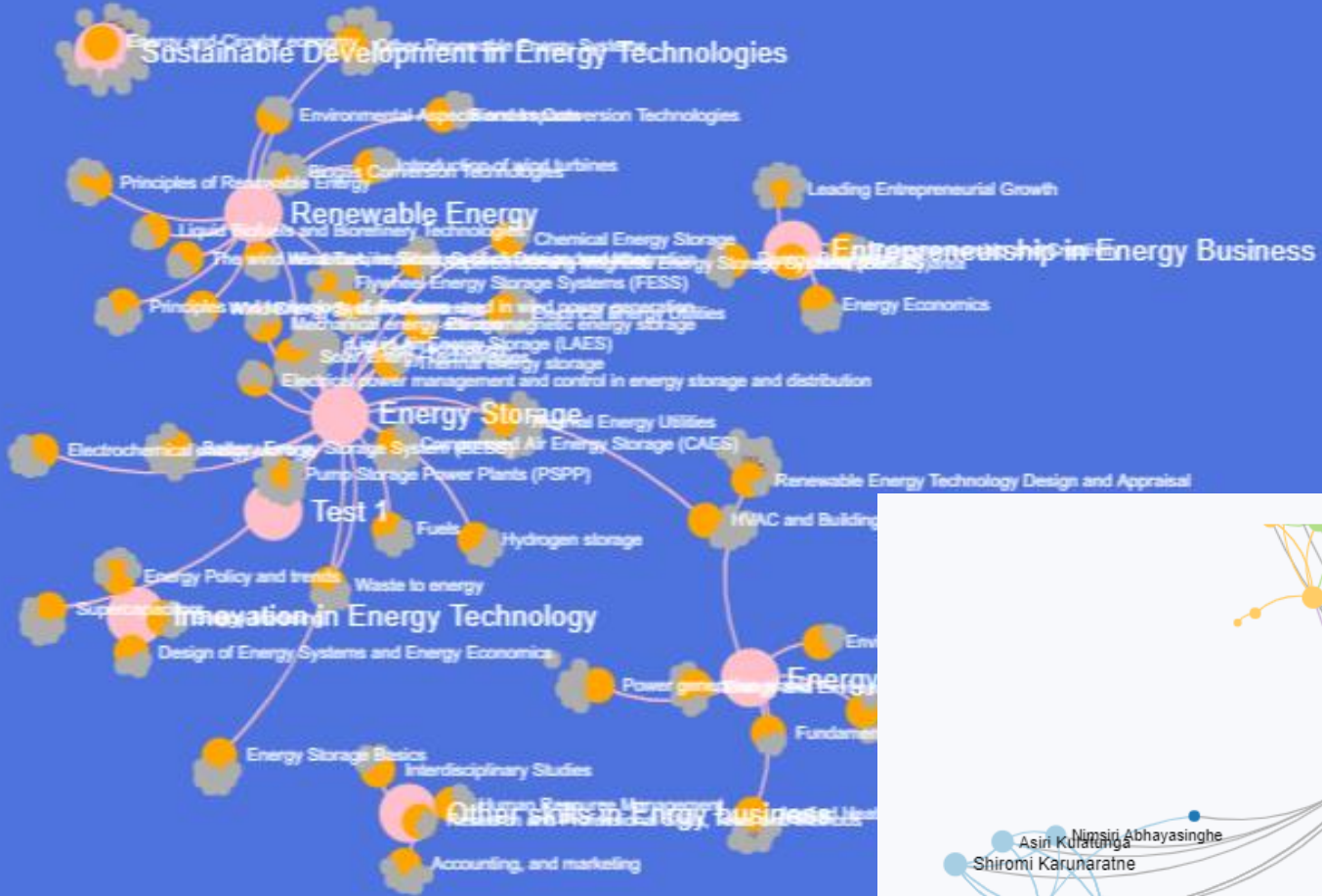
## Present use of the concept

- Modules from (probably) 100+ teachers available
- Programs (energy) to be started 2023:
  - **MSc: Sri Lanka (4 universities); Cuba (4 universities); Bolivia (1 university)**
  - **“Diplomado”: Bolivia (2 universities)**
  - **“Certificado”: Brazil (2 universities)**
- Individual courses created by individual teachers
- Programs in preparation (2024): Bolivia, Cameroon, Ecuador, Ethiopia, Guatemala, Mauritius, Mozambique, Peru

## How can basic learning material be used and reused?



# How can Collaboration between Educators be done?



# How can educators collaborate in detail?

Stackable Master Energy > Energy Conversion Technologies > SA002-T20: Turbomachinery

SA002-T20L02CM05: Aerodynam...  
SA002-T20L02CM01: Fundament...  
SA002-T20L02CM03: Turbojet Design, Turbofan...  
SA002-T20L02CM04: Aeroderivat...  
SA002-T20L02CM06: Vibration...  
SA002-T20L02CM07: Aeroelasticity

thermodynamics, mechanical work and efficiency of Brayton cycle machines.

Stored in MYPAGES

Type Author module

Last updated Feb 16 2022

More info >

Share

Update SCORM-package

Move resource

Create copy

Unpublish

Manage social data

Move resource to Trash

Share

- Copy link  
Copy link to Player or Editor
- Share with co-author**  
Give Editing Rights to other Authors
- Share with viewer  
Give viewing rights to other users
- Export  
Download and publish module to any LMS
- Publish  
Publish to a library

Select the part you want to copy and reuse in your module.

- L2CM02: Brayton Cycles
- Module
- L2CM02: Brayton Cycles
- Activity 2a: Video 1
- Activity 2b: Video 2**
- Activity 2c: Slides and other reading
- Activity 2d: Basic control questions (compulsory ACMCQ)
- Activity 2: Learning activities (including basic assessment)
- Activity 3a: Open-ended discussion questions
- Activity 3b: Submit & discuss your own questions
- Activity 3: Open-ended discussions
- Activity 4a: Conclusion and Main Take

**Creative commons licenses for reuse in open “not for profit” collaboration**

# And what about quality?

- Each learning resource goes through a self-evaluation, receiving a “Basic badge”
- A peer review can result in a “bronze”, ....., “Gold”, “Diamond” badge
- Example: <https://eusl.monitorboard.nl/quality-main.php?developer; SA002-T20L02CM07: Aeroelasticity - Learnify>

## Self-Evaluation & Peer Review Based upon **EIT** Label Handbook (European Institute of Innovation and Technology)

Digital Educational Resources Quality Assurance Toolkit

Self assessment for quality Feedback/Error Reporting for this tool

Please note that you can only use educational resources created by you or in which you are a co-author!

Digital Learning Resource URL

Learnify player mode link: <https://time.learnify.se/l/show.html#att/XXXX>

<https://time.learnify.se/l/show.html#att/1V23> Check the digital learning resource

SA002-T20L02CM07: Aeroelasticity

Module Title: Aeroelasticity Module Abstract: This Content Module includes 2 video lectures addressing aeroelastic design of compressor and turbine b ...

7 Keywords identified:

- thermodynamic cycles
- mechanical work
- efficiency
- entropy
- enthalpy
- turbomachinery design
- aeroelastic design

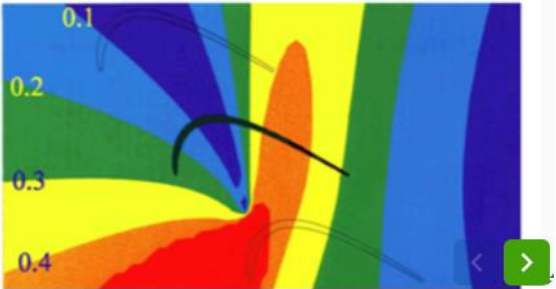
ELH: 4 h EQF: 7 BTL: 4 SMCTS: 0.15

Module

Last updated 24 days ago (02/03/2022)

Learnify

You cannot start the self-assessment for quality because the learning resource is missing essential information! There are 1 problems identified. Please check the **CRITICAL** labels



Metadata

- Intended Learning Outcomes **ATTENTION**
- Assessment **GOOD**
- Abstract, Uniqueness and Societal Relevance **GOOD**

EXPLORE Energy Community Network and Quality Framework

Quality Assurance Toolkit

Self evaluation of SA002-T20L02CM07: Aeroelasticity

Basic Scan

Learning Content Scan

Multimedia Scan

Assessment Scan

Certificate Quality Scan

Overall Quality Scan

Results

Module: SA002-T20L02CM07: Aeroelasticity

Basic Scan

0% complete

You answered 0 out of 16

Basic Scan measures the quality of the information provided under the important parameters at the introduction stage of the Module (Activity 1).

0 out of 16

criteria

Scan Centralized View →

Your activity is saved automatically as you proceed

Answer all:  Not Applicable  No  Yes

Criterion 1. Is there a clear SA/T/L/CM/AM identification number? **REQUIRED**

Choose your answer:  Not Applicable  No  Yes

DESCRIPTION

The coding system for the SA/T/L/CM/AM identification number is "SAxxx-TyyLzzCMdd: "

# Quality Improvement Process: Result and badges

## Self Assessment Compliance for Quality-Overall Results

The overall compliance is calculated as the percentage of fulfilled criteria for quality.



■ Compliance  
■ Non compliance

## Answer distribution

Answers	Count of answers	%
Yes	0	0%
No	0	0%
Not Applicable	0	0%
Unanswered	62	100%

## Needs Your Attention

Compliance 0 Unanswered 62

### Unanswered Criteria

Unanswered criteria can indicate a potential compliance issue with the learning resource. You should answer all criteria; if they are not applicable to your learning resource please use **Not applicable**

There are 62 unanswered criteria identified

Criterion	Scan
-----------	------

To avoid that all learners receive the same questions, and that learners receive different questions in each attempt, it is recommended to have more questions than the ones presented in each attempt. Have this been considered when designing some of the FAs?

Assessment Scan  
[Go to this criterion](#)

## Introduction about Module

### Foreword

Dear Learner,

This Module, titled "Light Water Reactors", contains 6 parts:

- A part titled "Overall principles and designs".
- A part titled "Balance Of Plant".
- A part titled "Thermal efficiency".
- A part titled "Pressurized Water Reactors".
- A part titled "Boiling Water Reactors".
- A part titled "Nuclear reactor safety".

In the light of the pedagogical methodology "student-centered education" requesting personal commitment and active participation by the learner, each Module is built up around a set of voluntary (like watch, read, etc.) and compulsory (multiple choice, open-ended, calculation, ...) activities in which the learner can self-determine the progress.

The learner is recommended to go through, in sequential order, the different parts and the associated activities throughout this Module.

You can have a look at any time at the entire structure of the Module, all parts and their contents by clicking on the menu button in the top left corner.

Intended Learning Outcomes

## explore Energy Digital Academy Quality Badge for Digital Learning Resources



This educational resource has gone through an extensive quality assessment process and fulfills all the relevant quality criteria for digital learning resources

For more information scan the QR code below



## After review



Great work! The learning resource has passed the initial quality checks!



The learning resource satisfies the compliance requirements and you can invite external reviewers for quality.

Please note that inviting external reviewers function is not yet available. Your self-evaluation results are saved and you will be able to come back later and invite external reviewers.

Your learning resource earned the Standard Quality Label! Congratulations!

[Download the quality badge](#)

- The badge is accessible to everyone and contains all the necessary "Meta-data" for quality.
- Next step: Include feedback from students

# EEDA: Intended for "Flipped Classroom" ([SA002-T20L02CM02: Brayton Cycles – Learnify](#))

## Activity 2: Learning activities (including basic assessment)

1

To fully assimilate the learning intended in this module, the learner is recommended to listen to the recordings, read the accompanying lecture slides, answer, and reflect upon, the Assessment Questions presented.

- ✓ Activity 2a: Video 1
- ✓ Activity 2b: Video 2
- ✓ Activity 2c: Slides and other reading
- ✓ Activity 2d: Basic control questions (compulsory ACMCQ)

## Activity 2d: Basic control questions (compulsory ACMCQ)

2

□ □ □ □ □

### Question 1 of 5:

For a Brayton cycle machine the change in entropy in a component is a function of:

- Temperature ratio, pressure ratio, and gas constants
- The lower calorific value
- The change in enthalpy
- Only the gas constants

## Activity 3 :Open-ended discussions

3b

This activity gives a possibility to reflect upon a set of, for the content module presented, Open-Ended Questions and discuss these with peers. It is also a possibility for the (for students registered for academic credits: compulsory) discussion :

The activity consists of:

- reflect upon, and respond to, the presented Open-Ended Questions (OEQ)

- ✓ Activity 3a: Open-ended discussion questions
- ✓ Activity 3b: Submit & discuss your own questions

## Bob Kielb

4

*Professor of the Practice in the Department of Mechanical Engineering & Materials Science*

Robert Kielb has over 45 years academic, industrial and government research laboratory experience in turbomachinery propulsion. This consists of 8 years with the U. S. Air Force, 10 years with NASA Lewis Research Center, and 12 years with GE Aircraft Engines as Manager of Aeroengine Technology. He has also been an Affiliated



5

## Duke Aerospace

*This Certificate is awarded to  
Torsten Fransson  
for Successful Completion of  
"Brayton Cycles"  
Spring 2022*

This certificate is automatically generated from the EXPLORE Energy Digital Academy after successful compliance with the automatically corrected assignments in this Learning Resource. The Learning Resource corresponds to 0.15 SMCTS at the POF 03 and BTL 1-3

This learning resource is part of a new international concept entitled "EXPLORE Energy Digital Academy" in which a large number of teachers and instructors from different organizations collaborate towards a common repository of high-quality reviewed Learning Resources. The program does not yet exist in any university worldwide but the partners are committed to try to establish the program at a university (or perhaps several) around the globe. In this concept learners can either (a) build up through various learning-paths, their own learning curve or (b) follow any of the programs a partner university has established, towards reaching the educational goals they have posed themselves.

- SMCTS (Stackable Master Credit) corresponds, from a broad perspective, to 27.5 Estimated Learning Hours for a learner.
- EQF (European Qualification Framework) Level #6

3a



**This sequence is locked**

You have to complete the previous sections.

# EEDA: Intended for “Laboratory exercises”

- A set of 20+ “Remote labs” in **energy** are under preparation (7 up running presently)
- These will allow a user “anywhere” to perform a lab “in real time” via remote access ([SA301-T01L01: UniWA Alios Star Remote PV Lab - Learnify](#))

(SA301-T01L01: Remote PV Lab)

### Activity 1: Introduction

remotely, through the internet, and in very short time, many educational live experiments. The reason for showing it is that the instructions for use mentioned in this exercise refer to this system.

- ✓ Overview of content
- ✓ Intended Learning Outcomes
- ✓ Assessment
- ✓ Abstract, Uniqueness and Societal Relevance
- ✓ Evaluation and Grading Criteria
- ✓ Study/Certificate Level, Expected Learning Hours
- ✓ Prerequisites

The interface also features a live video feed of solar panels on a roof and navigation arrows at the bottom.

- SA301-T1L01CM06: Translation of the I-V curve
- SA301-T1L01CM01: Instructions ...
- SA301-T1L01CM05: Determinatio...
- SA301- (Efficiency %)
- SA301- (Current vs Voltage graph)

### Hydraulic Turbine Remote Lab

Expected operational date: Autumn 2023

University: Universidad Mayor de San Simón (UMSS), Bolivia

Dr. Evelyn Cardozo  
evelyncardozo.r@ficyt.umss.edu.bo

# EEDA: Intended for Challenge-Driven Learning

Basic material for challenges available: Business Models; Pitch Training; Team Work; Technology Evaluation; ...

First Challenge in Sri Lanka (4 universities, 150 students) on March 15: "Hotel sector"

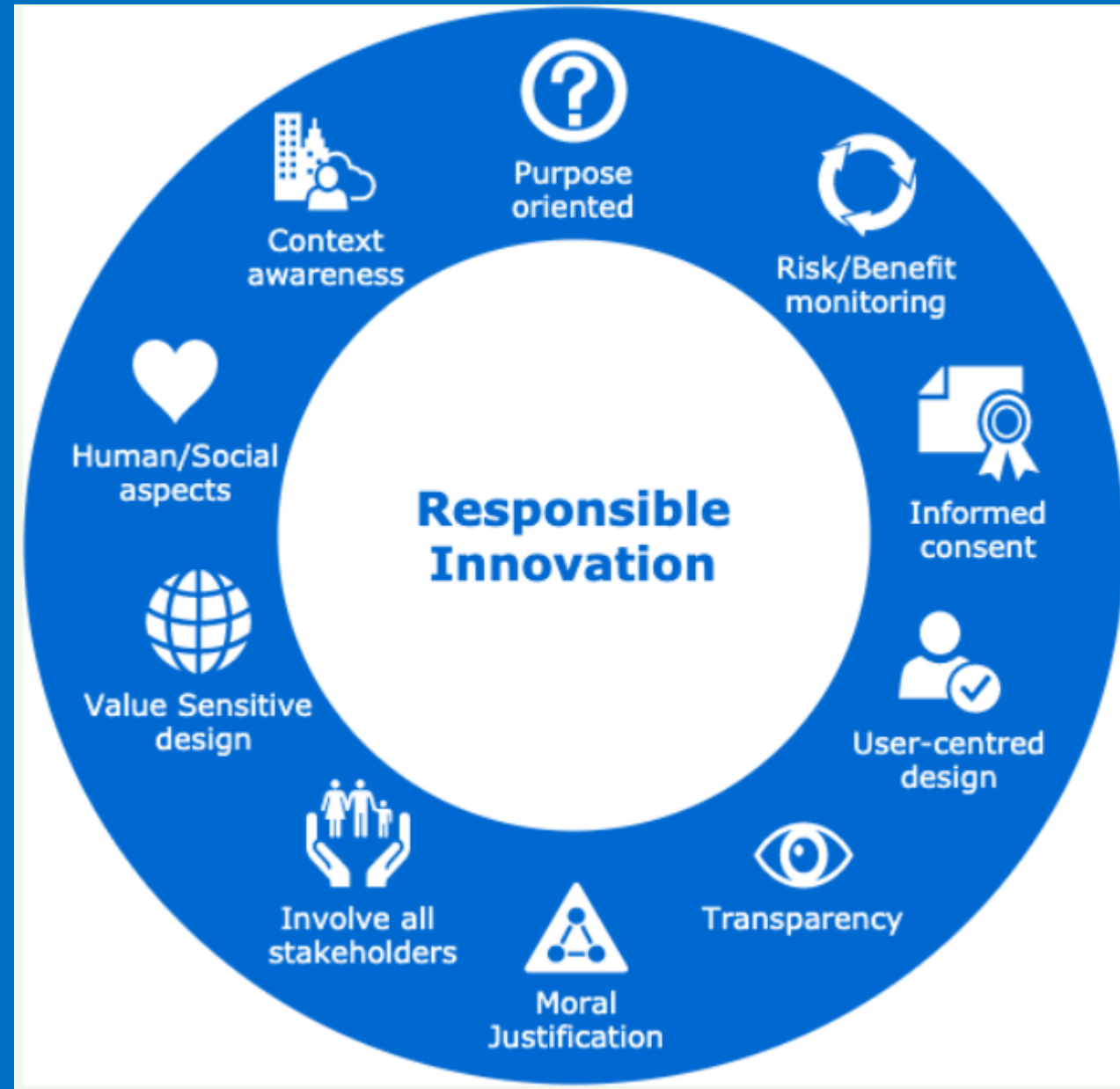
Stackable Master Energy > SA201: Challenges

The screenshot displays a grid of 24 challenge cards. Each card features a representative image and a title. The cards are arranged in four rows and six columns. The titles include: 'The Grand Hotel Challenge Roadmap', 'Challenge roadmap', 'Engage in Challenge Driven Learning', 'Why Challenge Driven Learning?', '(Draft) Business Case', '(DRAFT) Project management', '(Draft) From Canvas to action to...', '(Draft) MVP, Testing, Failing, Changing', '(Draft) Issues related to customers...', '(Draft) Getting an overview with ...', '(Draft) The Energy-Business', 'The Grand Hotel Challenge description', 'Technology Evaluation', 'The Grand Hotel Challenge', '(DRAFT) Grand Challenges in the field of Energy...', '(DRAFT) EXPLORE Energy Grand Challenges', 'Milestone 2 Identify relevant activities', 'Milestone 1 Guiding questions development', 'Identify relevant resources', 'Hotel sustainability audit', 'Sustainability analysis framework', and 'FUTURE?'.

Image	Title
	SA201-T02L01CM02 The Grand Hotel Challenge roadmap
	SA201-T01L01CM06 Challenge roadmap
	SA201-T01L01 Engage in Challenge Driven Learning
	SA201-T01L01CM01 Why Challenge Driven Learning?
	SA201-T01L04: (Draft) Business Case
	T01L01CM05: (DRAFT) Project management
	SA201-T01L04CM04: (Draft) From Canvas to action to...
	SA201-T01L04CM05: (Draft) MVP, Testing, Failing, Changing
	SA201-T01L04CM03: (Draft) Issues related to customers...
	SA201-T01L04CM02: (Draft) Getting an overview with ...
	SA201-T01L04CM01: (Draft) The Energy-Business
	SA201-T02L01CM01 The Grand Hotel Challenge description
	SA201-T01L03: Technology Evaluation
	SA201-T02L01 The Grand Hotel Challenge
	SA201: (DRAFT) Grand Challenges in the field of Energy...
	SA201-T01: (DRAFT) EXPLORE Energy Grand Challenges
	SA201-T02L01AM02 Milestone 2 Identify relevant activities
	SA201-T02L01AM01 Milestone 1 Guiding questions development
	Identify relevant resources
	Hotel sustainability audit
	Sustainability analysis framework

## Learning material on:

- 21<sup>st</sup> Century Skills
- Pitch Training
- Start your Energy Company
- Evaluate Existing Technology
- Professional Responsibility & Ethics



# EEDA: Intended for Case Studies

Case studies is an excellent way of learning



Case Study T1L01CM00:  
The Sant Cugat House...



Case s  
Knowir



Electrochemistry T1 L10  
CM0: Case Study...



Electrochemistry T1 L10  
CM1: Task one - Car...



Electrochemistry T1 L10  
CM2: Task two - Daily...



Electrochemistry T1 L10  
CM3: Task three - Cost...



Electrochemistry T1 L10  
CM4: Task four - Change ...



SA101-T01L09: Energy  
storage optimization in...



SA101-T01L09CM01:  
Introduction to the speed...



SA101-T01L09CM02:  
Energy storage...



SA101-T01L09CM03:  
Introduction to energy...



SA101-T01L09CM04:  
Optimization techniques...



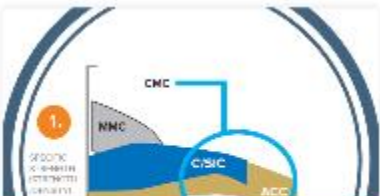
SA101-T51L01: (DRAFT)  
Case Study Gas Turbines ...



SA101-T51L01CM01:  
(DRAFT) Case Study Jet...



SA101-T51L01CM02: Case  
Study (DRAFT) Anticipate...



SA101-T51L01CM03: Case  
Study (DRAFT) Hot plates...



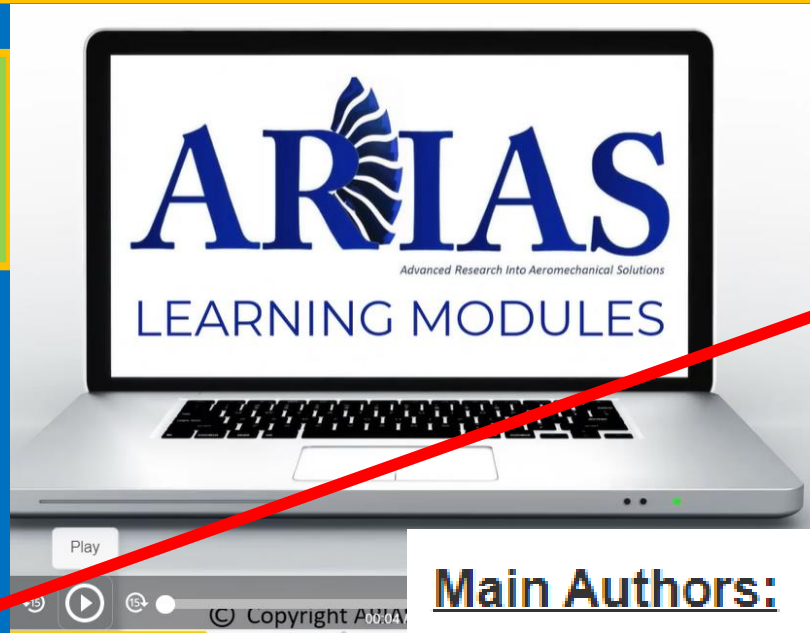
SA101-T51L01CM04: Case  
Study (DRAFT) Pelton...

Specialized courses on PhD level are hard to find:

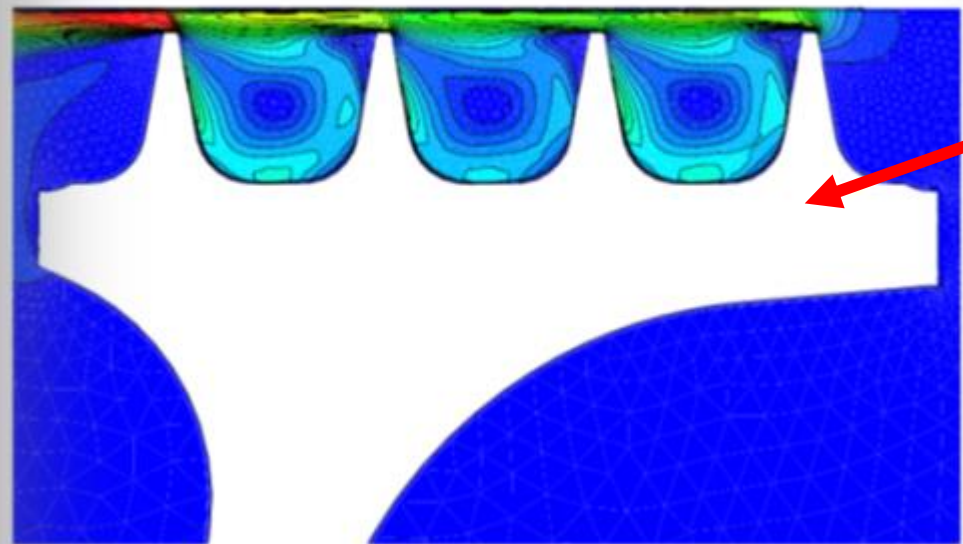
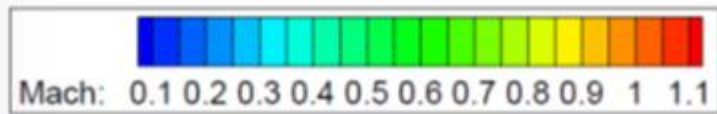
- ✓ Few students per supervisor / year => high-level courses are not developed
- ✓ Joining forces: Material reused => worthwhile to develop

Collaboration on education:

- ✓ Competitive edge while applying?
- ✓ Horizon2020 project: [ARIAS](#)



*World-wide unique learning material on seal flutter in turbomachinery*

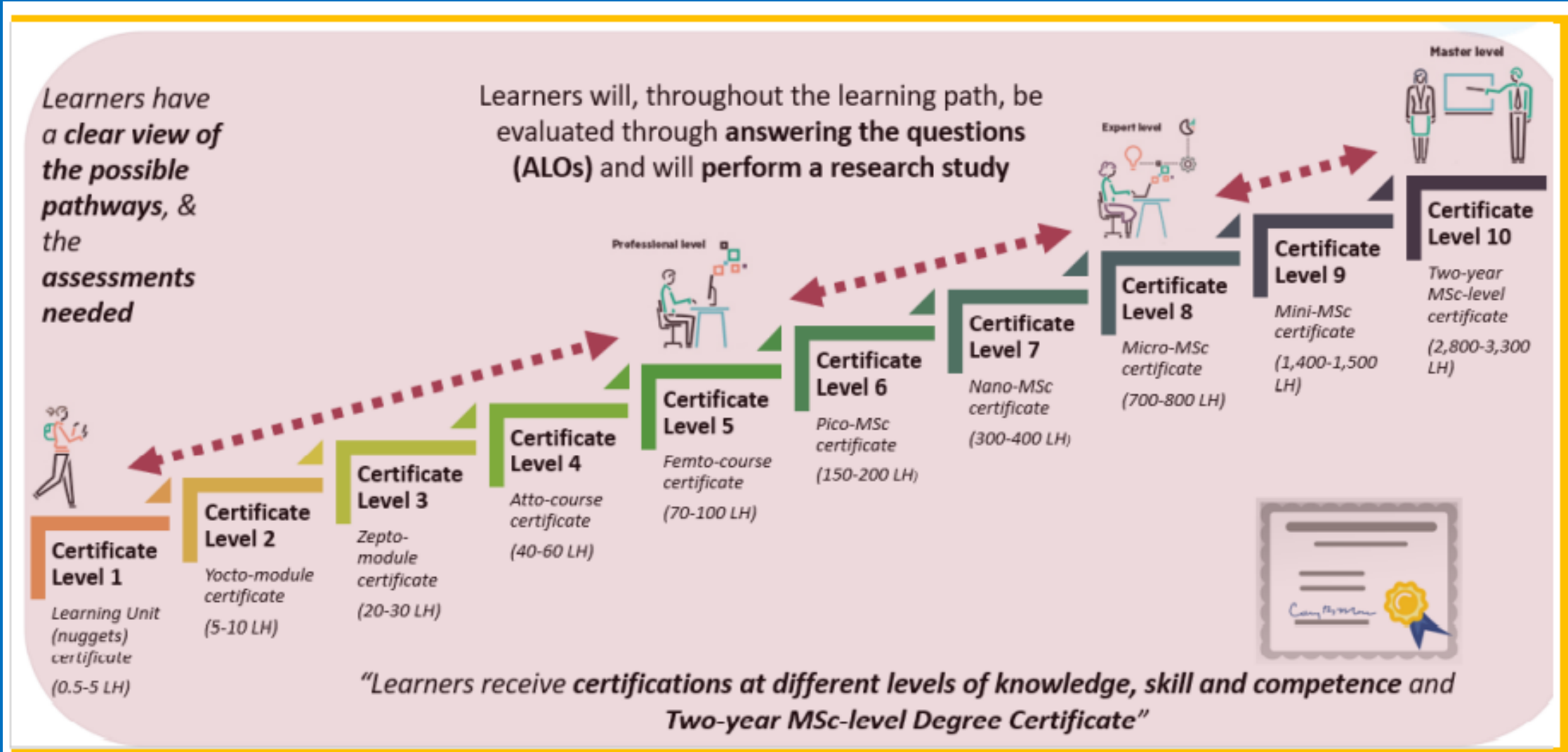


Main Authors:

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# EEDA: Intended to build own learning journeys

- Combining modules/lessons will enable receiving certificates that can lead to a broad learning journey



## EEDA Certified Educator

There are two ways of becoming an “EXPLORE Energy Digital Academy Certified Educator”



1: Having participated in, and strongly contributed to, the original development of the EEDA Quality Improvement Process in the concept.

2: Proving the capability to develop learning material that are fully compliant with the QIP. The following must be achieved:

i: Development and “QIP Self-evaluation” of 20 modules as per the QIP.

ii: Peer Review received of at least 3 own modules from 3 reviewers each with an average score of at least 3.5 with no criteria below 3.0

iii: Performed own Peer Review on at least 5 “Modules” and at least 3 “Lessons/Topics” from other authors

iv: Peer evaluation by 3 previous “EEDA Certified Teachers” of “proof of evidence” of the material under 2i-2.iii.

An EEDA Certified Teacher does not have a “position” in EEDA. The certification is entirely based upon the quality of the work performed as per above.

# And for students: How can (*presently*) BSc/MSc/PhD students use the material?

## ➤ Fully self-learning:

- ✓ Access to the whole repository to select the own learning journey (modules, lessons, topics, etc)
- ✓ Eventually team up with students with similar interest to learn commonly
- ✓ Learn and create their own “Automatically corrected certificate”

## ➤ Partially self-learning:

- ✓ Find modules/courses and contact the teacher to look at possibilities to participate in the class next time it is given

## ➤ Participating in a class at the “home university”

- ✓ Teacher recommends a specific link to the students ([SA002-T20L02CM02: Brayton Cycles](#))
- ✓ Then teacher performs live discussions

## ➤ Similar in the case of “Professional learning” as part of a “Short course”

## ➤ And various other ways

- **Framework for collaboration exists (Pilot: Circular Economy towards Energy)**
- **System built up around “small learning resources” (up to max 5 ELH for easy reuse)**
- **All Learning Resources contain academic metadata (ILOs, Credit levels, Assessments, .....**)
- **Quality Improvement Process to enhance quality, CDL, “Flipped Classroom”, ...**
- **Teachers can collaborate for enhanced quality and reduced workload**
- **“Global but Local”: Teachers can “shop around” and create their own “teaching lists”**
- **All material can be used by students, with individual “play lists”**

The opinions expressed are the authors alone, but based upon:

- Contributions from 200+ teachers over the years
- EU including EIT, Life-Long programs, Framework programs during many years

➤ More recently Erasmus+ Capacity Building in Higher Education

- EUSL-Energy
- EUBBC-Digital
- EU-BEGP
- EDU-ABCM



A photograph of a man in a white shirt and dark trousers standing inside a large, circular industrial machine, likely a turbine or compressor, in a factory or laboratory setting. The machine has a complex internal structure with many blades or vanes. The man is positioned in the center of the machine, looking towards the camera. The background shows industrial equipment and a large room.

Are we ready for  
take-off towards  
"Education 4.1"?