Learn STEM

Innovative Model of learning STEM in secondary schools

School Education
ERASMUS+

KA220-ADU -
Cooperation partnerships in adult education

Reference Number:
2022-1-TR01-KA220-SCH-000087583

Duration:
31.12.2022 to 30.12.2024 (24 months)

LearnSTEM

WP2: Learn STEM Pedagogical Model

Chair of Business and Human Resource Education II
Prof. Dr. Marc Beutner

Co-funded by the European Union

The 12 learning units – the STEM subjects

Sciences

- Physics
- Chemistry
- Biology

Technology

- digitisation / IT

Engineering

Mathematics

Schedule for WP2

Main activities:	Activity title:	Leading Organisation:	Period:
O1 - 1	Overview on existing practices in teaching STEM through innovative pedagogical approaches	UNIVERSITAET PADERBORN (E10208598 - DE)	31.12.2022-30.06.2023
O1 - 2	Mapping of key stakeholders to be involved in innovative STEM teaching activities	Ingenious Knowledge GmbH (E10122702 – DE)	31.12.2022-30.11.2023
O1 - 3	Define the LEARN STEM Pedagogical Model	UNIVERSITAET PADERBORN (E10208598 - DE)	01.08.2023-31.12.2023
O1 - 4	Develop the inquiry learning package	EURO-NET (E10118956 - IT)	01.03.2023-31.01.2024
O1 - 5	Evaluate the LEARN STEM Pedagogical Model and inquiry learning package	AHI EVRAN ANADOLU LISESI (E10206404 - TR)	01.07.2023-31.03.2024

The WPs of LearnSTEM

WP2:
LEARN STEM Pedagogical Model

WP3:
LEARN STEM Teacher Training Programme

Curriculum

MOOC

WP4:
LEARN STEM online learning environment

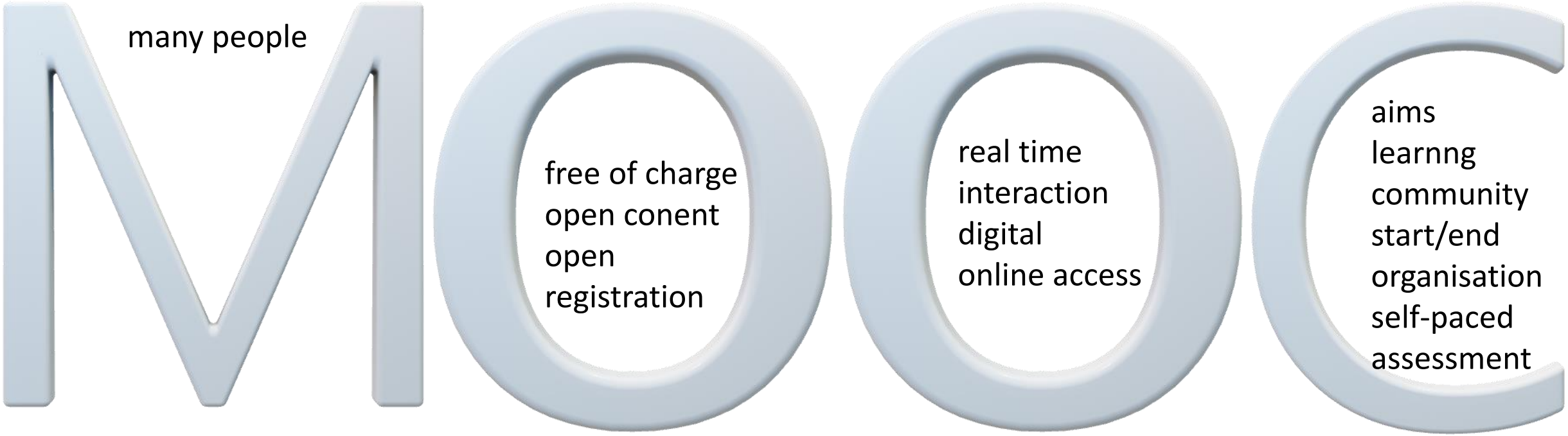
WP4a:
MOOC for Teachers

WP4b:
Testing with some learners

WP1: Project Management - ongoing task

WP5: TPMs

What is a MOOC ?



Massive Open Online Course

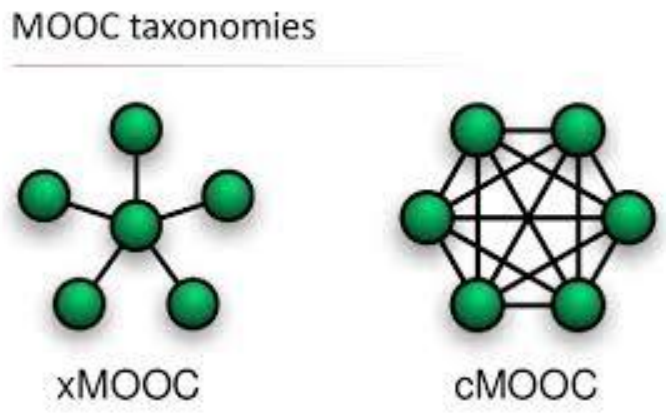
What is a MOOC ? Massive Open Online Course

xMOOC – extension MOOCS
Have their basis in university events –
large groups in the style of online frontal teaching with clear learning goals (Udacity, Coursera) - usually weekly inputs and task processing

cMOOC – connectivism MOOC
Learning goals are usually less precisely defined, the course relies on the active participation of the participants; Curriculum according to the main topics; Provider offers MOOC space and time

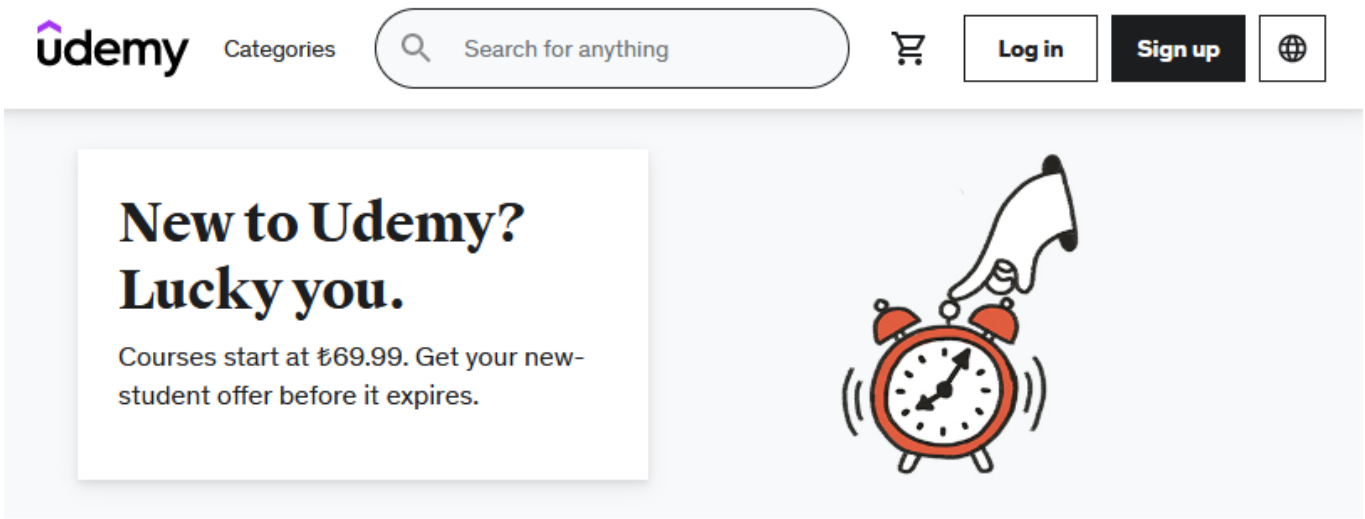
bMOOC – blended MOOC
combines cMOOC, xMOOC with face-to-face measures

smOOC – small groups



The MOOC will be designed in Udemy

xMOOC – extension MOOC



https://www.udemy.com/

The Pedagogical Model

1 **Sustainability Ecological Issue**

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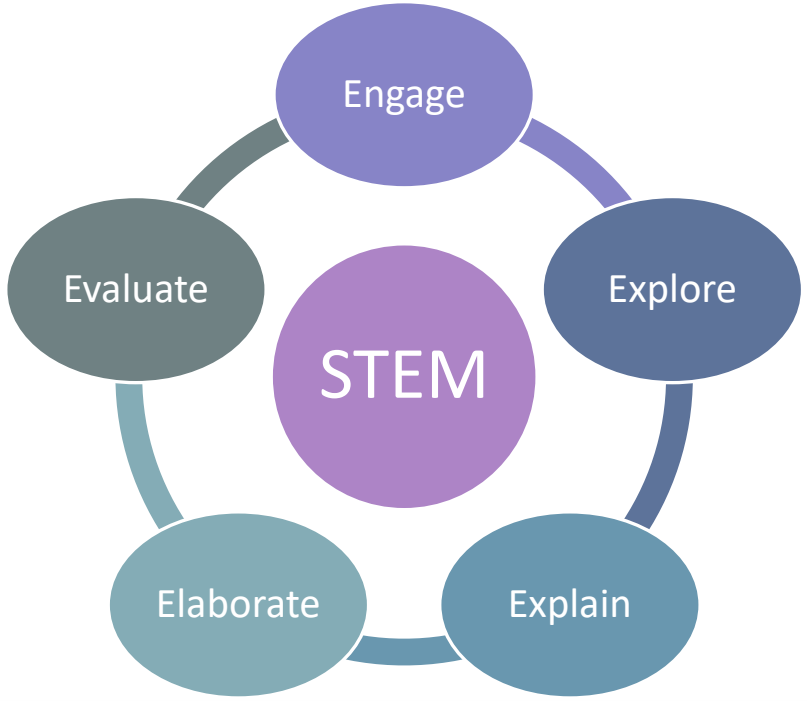
2 **Learning Cycle Approach**



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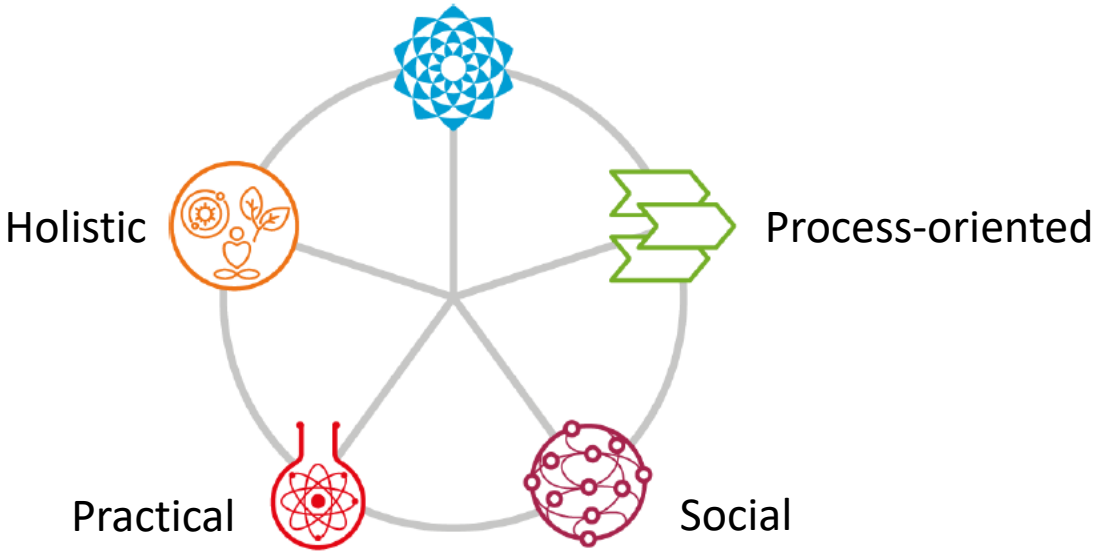
3 **Pedagogical Principles Approach**



5E-STEM

Vu Thi Ha / Le Hong Chung / Nguyen Van Hanh / Bui Minh Hai (2023): Teaching Science Using Argumentation-Supported 5E-STEM, 5E-STEM, and Conventional Didactic Methods: Differences in the Learning Outcomes of Middle School Students

Stracke, C. M., van Dijk, G., Daneniene, J., Kelmelyte, V., Lisdat, F., Wesolowski, A., Barreiros, A., Baltazar, R., Simoens, W., Desutter, J., Pascoal, A., Rimkevičė, A., Spatafora, M., Cotovanu, A. M., & Spatafora, A. (2019). Learn STEM. The Pedagogical Model for Innovative STEM Learning and Teaching. DOI: http://www.doi.org/10.5281/zenodo.3899929
Online available at: www.Learn-STEM.org/Model

The heuristic grit – which describes the learning units in LearnSTEM

Pedagogical process model

Principles	e1 engange	e2 explore	e3 explain	e4 elaborate	e5 evaluate
complex					
process-oriented					
holistic					
practical					
social					

Co-funded by the European Union

The 12 learning units – Topics of the experiments within LearnSTEM

Topic I
Recycling

Topic II
Pollution

Topic III
Nature

Topic IV
Climate

The 12 learning units –
4 Experiments within the topic of Recycling

Topic I
Recycling

	Physics	Chemistry	Biology	Engineering	IT	Mathematics
Collect and sort garbage		x	X		x	
Build a Balance Scale	X			x		X
Composting in a bottle and creation of a composter - reuse of biodegradable waste		x	x	x		
Upcycling – Reuse of plastic			x	x		

The 12 learning units –
4 Experiments within the topic of Pollution

Topic II
Pollution

	Physics	Chemistry	Biology	Engineering	IT	Mathematics
The tanker spills oil	x	x	x			
Acid Rain – Control acidity and PH value of lakes and puddles liquites in the kitchen and tab water		x	x		x	x
Sulfur dioxide destroys plants and buildings		x	x	x		
Fertilizer, Acid rain and algae growth		x	x			

The 12 learning units –
4 Experiments within the topic of Nature

Topic III
Nature

	Physics	Chemistry	Biology	Engineering	IT	Mathematics
Leaves transport and evaporate water	x		x			
How much bioorganisms are there? Yeest			x			x
Growth of plants and salinity - Irrigation and fertilization increases the salt concentration		x	x			x
The sun – energy – growth and danger	x		x		x	

The 12 learning units –
4 Experiments within the topic of Climate

Topic IV
Climate

	Physics	Chemistry	Biology	Engineering	IT	Mathematics
Smog and temperature inversions		x	x			
Storms and temperature – the fan and the cress	x		x			
Design a Skyscraper resisting the Wind	x			x		x
Seasons and Ecliptic Simulator https://www.climate.gov/teaching/resources/seasons-and-ecliptic-simulator	x		x		x	

Structure of the learning units

Video about the experiment

real part and video scribe part

+

Presentation with the subject-realted backgrounds

+

Interactive H5P-tasks

+

Interactive H5P-tasks

Schools will create learning resources

Who will take the responsibility for which learning units / topics?

Tasks to do until the meeting in Paderborn – Suggested meeting dates

2. TPM	UNIVERSITAET PADERBORN (E10208598 - DE) Warburger Str. 100 33098 Paderborn	Germany	12.09.2023-14.09.2023 or 19.09.2023-21.09.2023	Analyse the state of the art of activities of WP2 and the development of WP3

Suggested meeting dates for the TPM 3 in Greece

3. TPM	IEK KAVALAS (E10091139 – EL)	Greece	01.11.2023-03.11.2023 or 06.11.2023-08.11.2023 or 04.12.2023 06.12.2023	Partners organize a half-day European Seminar for disseminating the project results

Tasks to do until the meeting in Paderborn

1. Overview on existing practices in teaching STEM through innovative pedagogical approaches
   - each of the 8 partners will describe four existing practices of fostering STEM in the own country
   - UPB will provide a template until the 15th of May 2023

2. Mapping of key stakeholders to be involved in innovative STEM teaching activities
   - each partner provides an overview about 10 Key stakeholders in the own country
   - IK will provide a template until the 15th of May 2023

Tasks to do until the meeting in Paderborn

3. The schools will gather existing learning resources for the learning units they are responsible for. They also create a first draft presentation on the learning units
   - UPB will provide a template until the 15th of May 2023
4. Creation of dissemination materials
   – at least a flyer and a newspaper article by each partner

Contact

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http://www.upb.de/wipaed

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Thank you for your attendance.
Do you have any questions?