

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

Transnational Partner Meeting 1

24th to 27th of April 2023 in Konya, Turkey

25th of April 2023

WP2: Learn STEM Pedagogical Model

Presentation of the leading partner:
University of Paderborn



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

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Co-funded by
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The department and the chair



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Chair of Business, Human Resource Education and Evaluation Research
Prof. Dr. Marc Beutner



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Co-funded by the European Union

The Chair in portrait



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Tim Eickels, Ilona Petsch, Sebastian Koppius, Jennifer Schneider, Elmar Janssen, Prof. Dr. Marc Beutner, Niclas Grüttner, Helene Lindenthal, Annette Steffens



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The 12 learning units – the STEM subjects



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Sciences

Physics

Chemistry

Biology

Technology

digitisation
IT /

Engineering

Mathematics



Schedule for WP2



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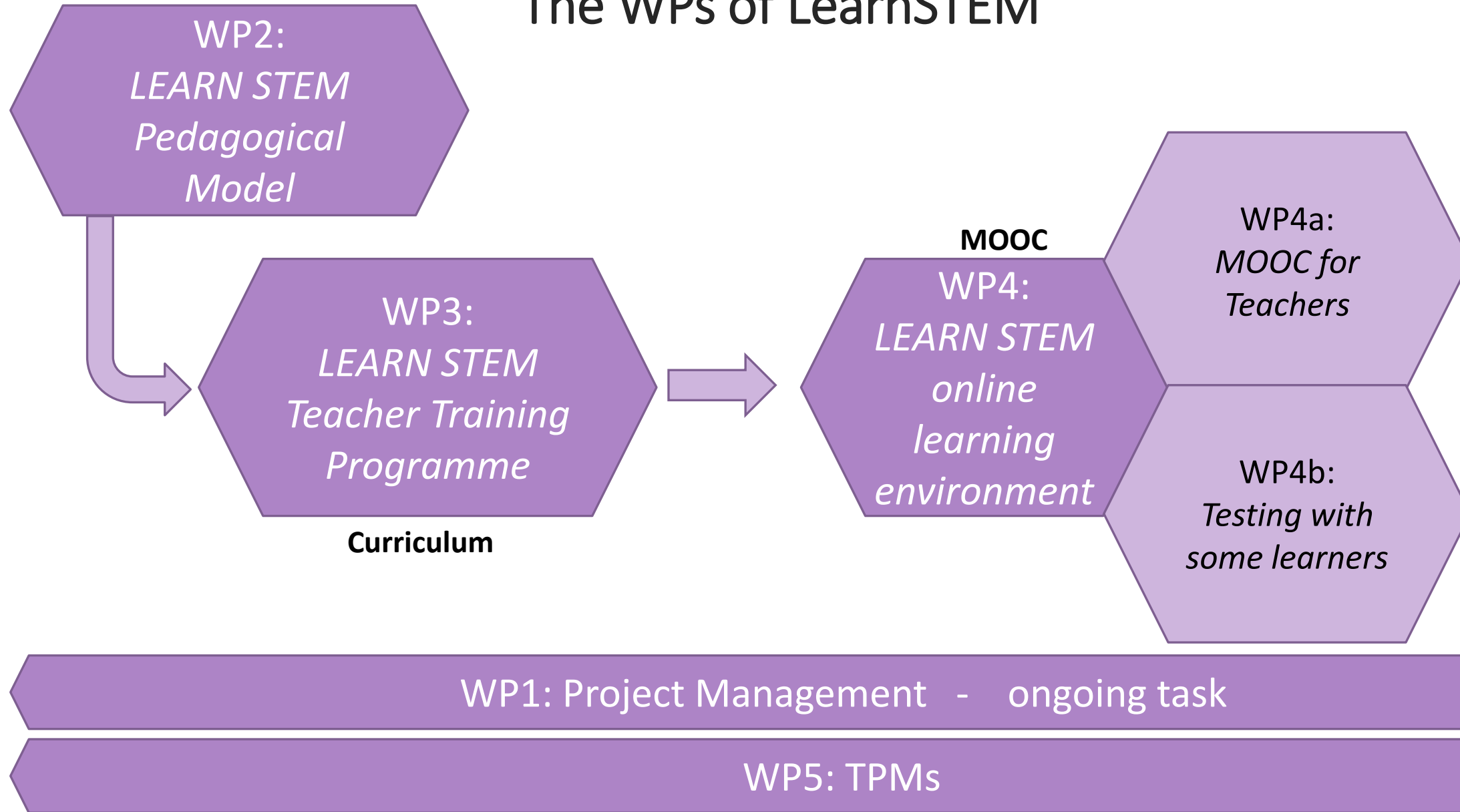
Main activities:	Activity title:	Leading Organisation:	Period:
O1 - 1	Overview on existing practices in teaching STEM through innovative pedagogical approaches	UNIVERSITAET PADERBORN (E10208598 - DE)	31.12.2022- 30.06.2023
O1 - 2	Mapping of key stakeholders to be involved in innovative STEM teaching 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



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What is a MOOC ?



many people

M

Massive

free of charge
open content
open
registration

O

Open

real time
interaction
digital
online access

O

Online

aims
learning
community
start/end
organisation
self-paced
assessment

C

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

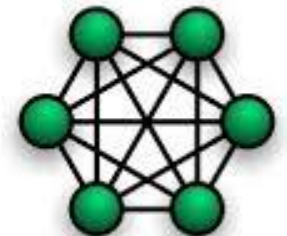
combines cMOOC, xMOOC with face-to-face measures

smOOC – small groups

MOOC taxonomies



xMOOC

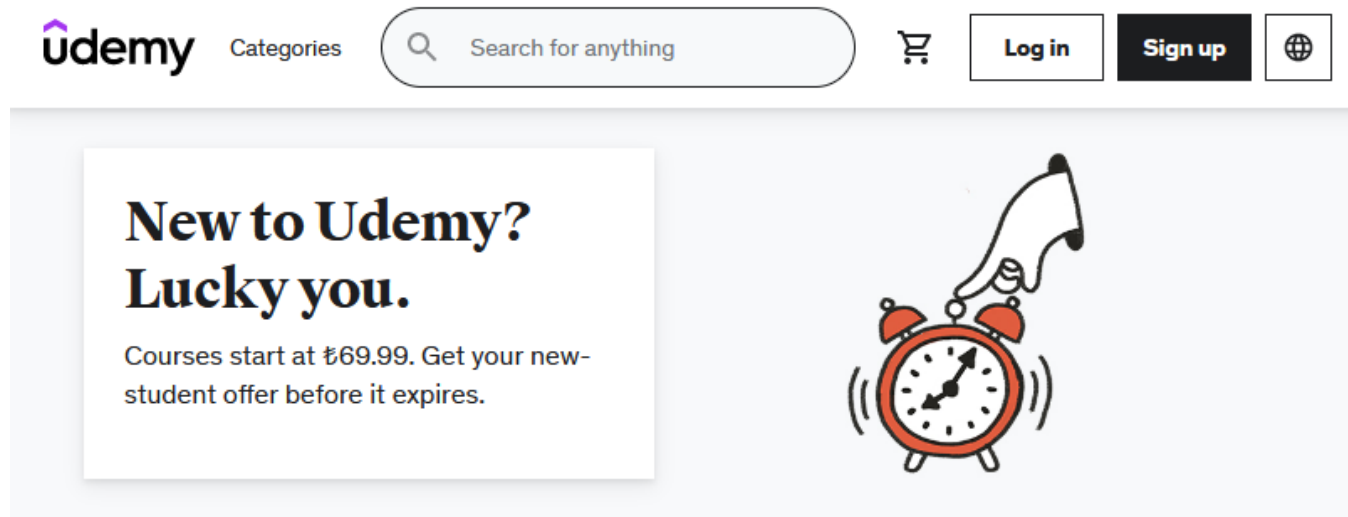


cMOOC



The MOOC will be designed in Udemy

xMOOC – extension MOOC



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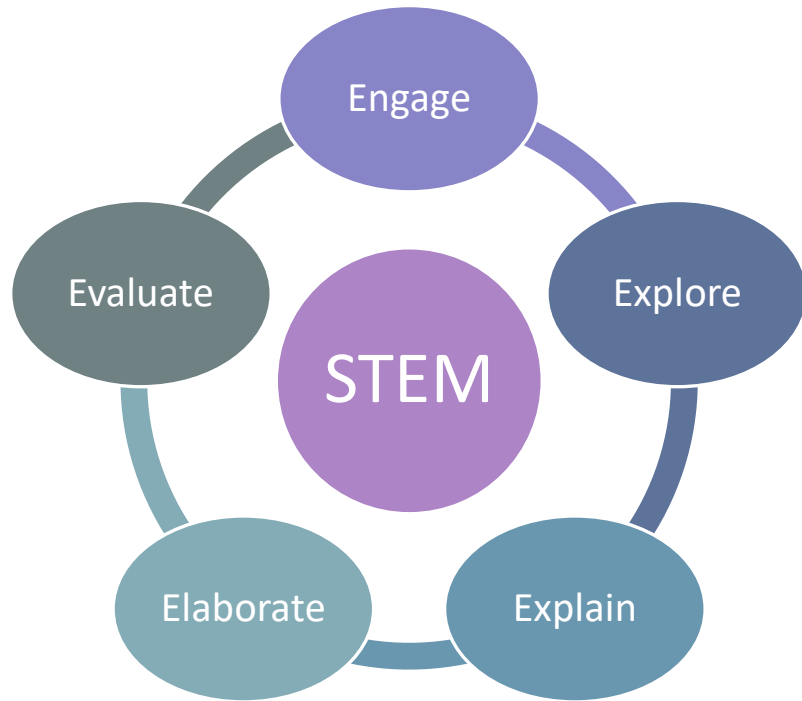


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The Pedagogical Model

2 Learning Cycle 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

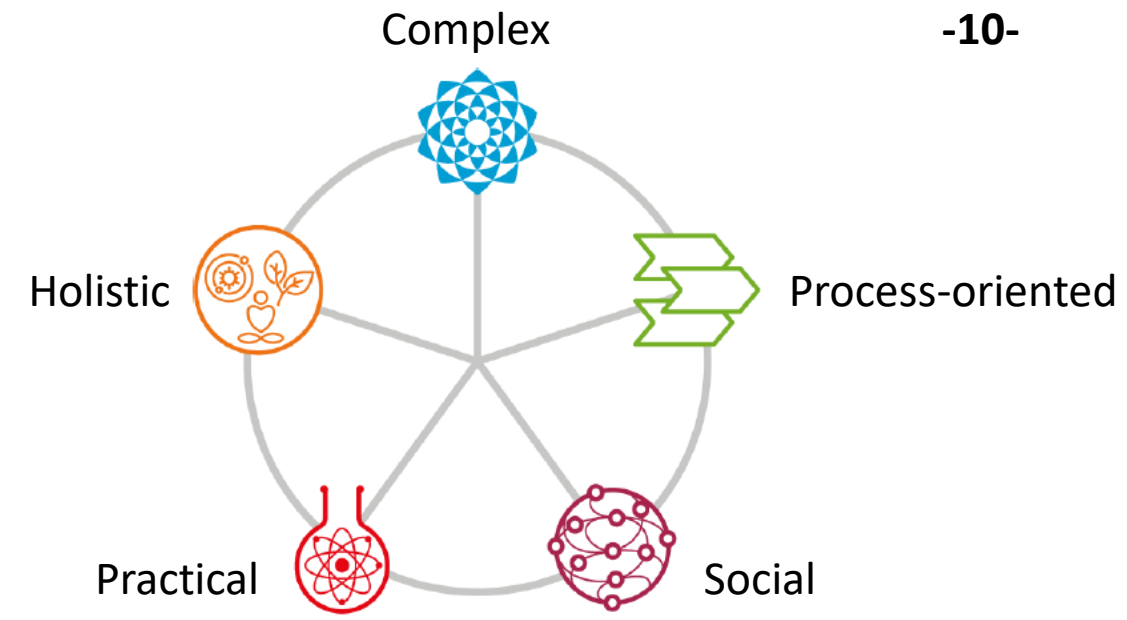
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3 Pedagogical Principles Approach

+



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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



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The heuristic grit – which describes the learning units in LearnSTEM



Pedagogical process model

		e1 engage	e2 explore	e3 explain	e4 elaborate	e5 evaluate
P r i n c i p l e s	complex					
	process-oriented					
	holistic					
	practical					
	social					



The 12 learning units – Topics of the experiments within LearnSTEM

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Topic I
Recycling

Topic II
Pollution

Topic III
Nature

Topic IV
Climate



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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? Yeast			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

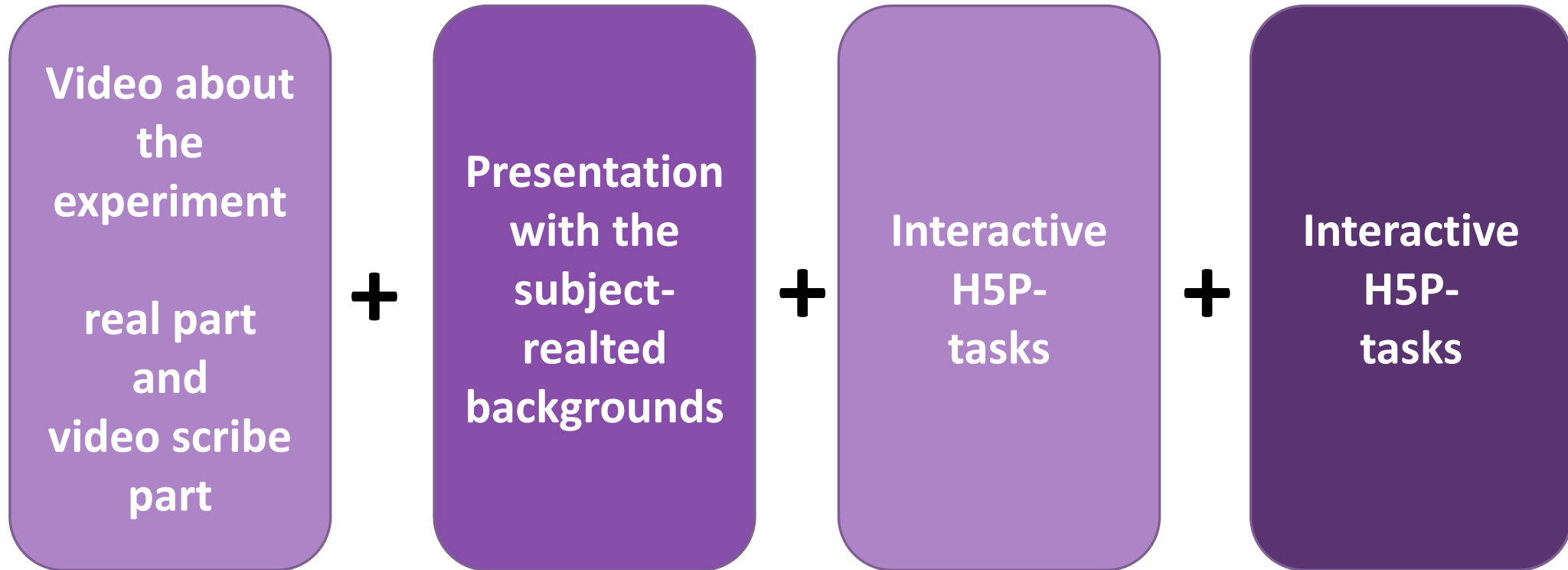
Topic IV Climate

	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



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Schools will create learning resources



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



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



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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
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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
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Tasks to do until the meeting in Paderborn



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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



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

