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STEAME ACADEMY
TEACHING FACILITATION LEARNING & CREATIVITY PLAN (L&C PLAN) - LEVEL 2
STUDENT TEACHERS: Sea level rise - extended

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1. Overview

Title	Urban heat effect
Driving Question or Topic	*Due to climate change, sea levels are rising, threatening coastal communities and ecosystems. How can we understand, mitigate, and adapt to these changes?*
Ages, Grades, …	*Age selection 17-18* *K-12 grade level selection*
Duration, Timeline, Activities	*10 hours* *6 hours* *Always lesson blocks of 2 lessons (2 x 45-50 min)*
Curriculum Alignment	Climate change, calculations, data handling, web search, coastal geography
Contributors, Partners	*EUROGEO*
Abstract - Synopsis	*A comprehensive study of the causes and impacts of sea level rise, including data analysis and comparison of coastal changes over time. The project will examine the ecological and socio-economic effects of rising sea levels and explore mitigation and adaptation strategies.*
References, Acknowledgements	https://education.nationalgeographic.org/resource/sea-level-rise/ https://coast.noaa.gov/slr/ https://www.ipcc.ch/sr15/chapter/chapter-3/

2. STEAME ACADEMY Framework*

Teachers' Cooperation	***Teachers geography:*** ● *Analyze sea level data and its impact on coastal regions.* ***Teacher biology, geography, informatics:*** ● *investigate ecological consequences and impacts on human communities* ***Teacher biology, physics, chemistry:*** ● *Study the effects on marine life and coastal ecosystems.* ● *Explore physical causes and chemical implications of sea level rise* ***Teachers Technology & Art:*** ● *Create or modify an existing coast alrea to make it more resilient, to sea level rise.*

	Teachers Economics: ● *Calculate the costs and benefits of mitigation and adaptation strategies.*
STEAME in Life (SiL) Organization	*Meeting with municipalities, local organisations …* *public & private*
Action Plan Formulation	*Reference to the Stages and the Steps of the STEAME ACADEMY Framework for Project-based STEAME learning (Action Plan Formulation)* *Step 1: Theoretical background knowledge* ● *Understand the basic principles of sea level rise: analyze historical data and projections.* ● *Study the physical and chemical processes contributing to sea level rise.* *Step 2: Extension of theoretical knowledge* ● *Investigate the impacts on coastal communities and ecosystems.* ● *Examine the role of climate change in accelerating sea level rise.* *Step 3: Formulation and definition of the project* ● *Formulate a clear objective: develop strategies for mitigating and adapting to sea level rise.* ● *Define specific mitigation and adaptation strategies, such as coastal defenses and sustainable development* *Step 4: Application of knowledge* ● *Implement the theoretical knowledge and strategies into practical mitigation and adaptation plans* ● *Modify an existing coastal area or create a new design that integrates mitigation and adaptation strategies effectively, aiming for sea level rise resilience and sustainability.* *Step 5: Evaluation* ● *Calculate the costs and benefits of the implemented climate resilience strategies considering both monetary and non-monetary factors such as improved health outcomes and ecosystem services.* ● *Assess the effectiveness and sustainability of the proposed strategies.*

[*] *under development the final elements of the framework*

3. Objectives and Methodologies

Learning Goals and Objectives	*After completing the project, students should* *- Know the basic principles of sea level rise.* *- Understand the impacts on coastal regions and communities.* *- Know strategies for mitigation and adaptation.* *- Understand the importance of sustainable coastal management* *- Be able to calculate costs and benefits of the applied strategies.*
Learning Outcomes and expected Results	*After completing the project students should:* **Knowledge** ● *Basic principles of sea level rise (chemistry, physics)* ● *Strategies for coastal resilience (Engineering)*

	• *Climate change impacts on sea levels (geography)* • *Coastal ecosystem dynamics (biology)* **Skills** - *Data analysis using GIS.* - *Mathematical calculations (average, range).* - *Presentation and communication skills* - *Artistic creativity.* **Attitudes** - *Develop interest in climate change impacts.* - *Develop interest in sustainable development.* - *Develop interest in STEAME fields*
Prior Knowledge and Prerequisites	**Prior knowledge - skills:** • *Basic mathematical calculations.* • *Basic knowledge of environmental science and biology.* • *Basic use of office and GIS applications.* • *Teamwork and communication skills* **Prerequisites:** • Laboratory with web access. • Office suite and GIS tools. • Fieldwork equipment. • Teleconference platform. • Presentation equipment (projector/presentation screen)
Motivation, Methodology, Strategies, Scaffolds	**Motivation** • *Highlight the real-world impact of sea level rise.* • *Apply project results to local contexts* **Methodology** *Project-based learning with interdisciplinary teacher collaboration and student teamwork.* **Strategies** *Project based learning.* *Work in small teams.* *Guided discovery* *Autonomous work* **Scaffolds** *Guidance and consultancy* *Additional information sources* *Computer laboratory access and support* *Collaborative development of products and evaluation methods*

4. Preparation and Means

Preparation, Space Setting, *Troubleshooting Tips*	*The teacher mainly in charge of the project is the Geography Teacher.* *The Geography teacher discusses with the other teachers the goals and the concept of the project and the implementation steps. He/She accesses initially the sources of information and together with the other teachers set the timeframe of their intervention. He/She prepares a project presentation sheet containing also the information from the other teachers. They all have a preliminary access to the information sources. All the teachers together decide on the timeframe of implementation of the project.* *This project involves all science teachers + math and informatics teacher* *Depending of how much time is available and how many subject will be involved the timeframe will shorter or longer.* *For the realization of the project students work in their classroom and in the computer laboratory, and also perform field work*
Resources, Tools, Material, Attachments, Equipment	**Classroom** *A computer with access to the internet, office applications and teleconferencing applications is needed and presentation equipment for the presentation of new concepts, the presentation of the students works and the communication with the external actors.* **Computer laboratory** *In the laboratory students will work in teams for the access to online resources and for the collection, analysis and presentation of the data. Therefore computers with access to the internet and office applications installed are needed.*
Health and Safety	*There are no particular health and safety concerns or precautions as the project is implemented inside the school unit.*

5. Implementation

Instructional Activities, Procedures, Reflections	*This plan is developed under the assumption that it extents to 10 study hours based on each time 2 lesson blocks (so 90-100 minute lessons). Classes are held once a week in the context of additional activities in secondary education. The leading teacher (Geography teacher -T1) is involved in all lessons, the teacher of biology (T2), physics (T3), informatics (T4) and mathematics (T5), art (T6), engineering (T7), and economics (T8) are involved in specific project stage and during implementation following the organization and scheduling of the project.* *Lesson block 1* *T1* *25 minutes presentation of the project to the students* *- reasing motivation* *- definition of project* *- presentation of collaboration* *T1, T2, T3* *Learning stations on* ● *physical processes of sea level rise (physics)* ● *chemical processes of sea level rise (chemistry)* ● *know the principles of GIS & remote sensing (geography)* *Lesson block 2* *T1, T3* *Using GIS analyses, remote sensing and data analysis of sea level changes* *T1, T5*

	Statistics on the impacts of sea level rise *Lesson block 3* *T1, T2, T3* *Field observation of local coastal areas – linking to analysis results done via remote sensing* *Lesson block 4* *T1, T2, T3, T4* *Studying mitigation and adaptation strategies.* *Creating practical solutions* *Creating presentation* *Lesson block 5* *T1, T4, T5, T6* *Using software, students will create a computer model of their solutions and, if possible, create a real model.* *Lesson block 6* *T1, T4, T7* *Using real prices of products, students will calculate the cost of their proposed model.* *Lesson block 7* *Presentation of the results of the different groups to the teachers* *Peer evaluation* *General evaluation & feedback*
Assessment - Evaluation	*Evaluation is based on the final product of the students and is carried out by the teachers and the students of the other team*
Presentation - Reporting - Sharing	*The final result of the project is presented to the teachers and the students of the other team. Other participants, like students from another class can also be present.*
Extensions - Other Information	*See version Level 2*

Resources for the development of the STEAME ACADEMY Learning and Creativity Plan Template
In the case of learning through project-based activity

STEAME ACADEMY Prototype/Guide for Learning & Creativity Approach
Action Plan Formulation

Major steps in the STEAME learning approach:

STAGE I: Preparation by one or more teachers

1. **Formulating initial thoughts** on the thematic sectors/areas to be covered: Teachers brainstorm on key topics related to sea level rise, including its causes, impacts, and possible solutions.
2. **Engaging the world** of the wider environment / work / business / parents / society / environment/ ethics: Teachers connect with local organizations, municipal bodies, and environmental agencies to gather resources and support for the project.
3. **Target Age Group** of Students - Associating with the Official Curriculum - Setting Goals and Objectives: Define the student age group, align project goals with curriculum standards, and set clear objectives.
4. **Organization of the tasks** of the parties involved - Designation of Coordinator - Workplaces etc.: Assign roles to teachers, designate a project coordinator, and identify the spaces and resources needed for the project.

STAGE II: Action Plan Formulation (Steps 1-18)

Preparation (by teachers)

1. **Relation to the Real World – Reflection**: Discuss the real-world implications of sea level rise with students.
2. **Incentive – Motivation**: Inspire students by showing the local impact and potential to make a difference.
3. **Formulation of a problem (possibly in stages or phases) resulting from the above**: Define the problem statement and break it down into manageable stages.

Development (by students) – Guidance & Evaluation (in 9-11, by teachers)

4. Background Creation - Search / Gather Information:
   Students gather data on sea level rise and its impacts.
5. Simplify the issue - Configure the problem with a limited number of requirements:
   Focus on specific aspects of sea level rise for detailed study.
6. Case Making - Designing - identifying materials for building / development / creation:
   Plan practical projects or experiments to study sea level rise.
7. Construction - Workflow - Implementation of projects:
   Students carry out their planned activities.
8. Observation-Experimentation - Initial Conclusions:
   Collect data and make preliminary observations.
9. Documentation - Searching Thematic Areas (AI fields) related to the subject under study – Explanation based on Existing Theories and / or Empirical Results
   Document findings and relate them to existing theories.
10. Gathering of results / information based on points 7, 8, 9
    Compile all data and observations.
11. First group presentation by students
    Present initial findings to peers and teachers.

Configuration & Results (by students) – Guidance & Evaluation (by teachers)

12. Configure STEAME models to describe / represent / illustrate the results
    Create models to visualize findings.
13. Studying the results in 9 and drawing conclusions, using 12:
    Analyze data and draw conclusions.
14. Applications in Everyday Life - Suggestions for Developing 9 (Entrepreneurship - SIL Days):
    Explore practical applications and solutions.

Review (by teachers)

15. Review the problem and review it under more demanding conditions:
    Reassess the problem with additional complexity.

Project Completion (by students) – Guidance & Evaluation (by teachers)

16. Repeat steps 5 through 11 with additional or new requirements as formulated in 15:
    Refine and repeat experiments with new parameters.
17. Investigation - Case Studies - Expansion - New Theories - Testing New Conclusions:
    Conduct deeper investigations and test new hypotheses.
18. Presentation of Conclusions - Communication Tactics:
    Present final results and communicate findings effectively.

STAGE III: STEAME ACADEMY Actions and Cooperation in Creative Projects for school students

Title of Project: Urban heat effect - lite
Brief Description/Outline of Organizational Arrangements / Responsibilities for Action

STAGE	**Activities/Steps** Teacher 1(T1) Cooperation with other teachers and student guidance	**Activities /Steps** **By Students** Age Group: 17-18 y
A	Preparation of steps 1,2,3, 4, 5	
B	Guidance and support in steps 4-10	Steps 4-10
C	Creative Evaluation	11
D	Guidance and support	12
E	Guidance and support	13 (9+12)
F	Organization (SIL) STEAME in Life	14 Field work & meeting with local council
G	Preparation of step 15	
H	Guidance and support	16 (repetition 5-11)
I	Guidance and support	17
K	Creative Evaluation	18