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## STEAME ACADEMY

### TEACHING FACILITATION LEARNING & CREATIVITY PLAN (L&C PLAN) - LEVEL 1

#### STUDENT TEACHERS: **Gulf Stream drops - lite**

**S**

**T**

**Eng**

**A**

**M**

**Ent**



### 1. Overview

Title	Urban heat effect
Driving Question or Topic	<i>How does the dropping Gulf Stream affect climate change, and what are the potential global consequences?</i>
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	Oceanography, climate science, data handling, web search, EUROGEO
Contributors, Partners	
Abstract - Synopsis	<i>A study examining the potential effects of the weakening Gulf Stream on global climate patterns, focusing on the potential for more extreme weather events, changes in sea level, and shifts in marine ecosystems. The project also explores mitigation strategies and the importance of international cooperation in addressing these issues.</i>
References, Acknowledgements	<a href="https://blog.education.nationalgeographic.org/2018/04/16/sluggish-gulf-stream-reaches-slowest-rate-in-more-than-1000-years/">https://blog.education.nationalgeographic.org/2018/04/16/sluggish-gulf-stream-reaches-slowest-rate-in-more-than-1000-years/</a> <a href="https://ocean.weather.gov/gulf_stream.php">https://ocean.weather.gov/gulf_stream.php</a> <a href="https://www.ncei.noaa.gov/news/gulf-stream-resilience">https://www.ncei.noaa.gov/news/gulf-stream-resilience</a> <a href="https://www.sciencedirect.com/topics/earth-and-planetary-sciences/ocean-currents">https://www.sciencedirect.com/topics/earth-and-planetary-sciences/ocean-currents</a>

### 2. STEAME ACADEMY Framework\*

Teachers' Cooperation	<p><b>Teachers geography:</b></p> <ul style="list-style-type: none"> <li>via remote sensing analysis of Gulf Stream patterns and global ocean currents.</li> </ul> <p><b>Teacher biology, geography, informatics:</b></p> <ul style="list-style-type: none"> <li>investigate the impact on marine ecosystems and biodiversity.</li> </ul> <p><b>Teacher physics</b></p> <ul style="list-style-type: none"> <li>investigate Oceanic and atmospheric dynamics</li> </ul> <p><b>Teacher chemistry</b></p>
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	<ul style="list-style-type: none"> <li>investigate changes in salinity</li> </ul> <p><b>Teacher informatics, geography</b></p> <ul style="list-style-type: none"> <li>data analysis and visualization using GIS tools</li> </ul>
STEAME in Life (SiL) Organization	Meeting with municipalities, local organisations ... public & private
Action Plan Formulation	<p>Reference to the Stages and the Steps of the STEAME ACADEMY Framework for Project-based STEAME learning (Action Plan Formulation)</p> <p><i>Step 1: Theoretical background knowledge</i></p> <ul style="list-style-type: none"> <li>Understand the basic principles of the Gulf Stream and its role in global climate.</li> <li>Grasp the concepts of oceanic and atmospheric dynamics affecting the Gulf Stream.</li> </ul> <p><i>Step 2: Extension of theoretical knowledge</i></p> <ul style="list-style-type: none"> <li>Investigate the potential impacts of a weakening Gulf Stream on climate patterns and marine ecosystems.</li> <li>Deepen understanding of the physical and chemical changes in the ocean</li> </ul> <p><i>Step 3: Formulation and definition of the project</i></p> <ul style="list-style-type: none"> <li>Formulate clear objectives: Assess and propose mitigation strategies for the impacts of the weakening Gulf Stream.</li> <li>Define specific strategies for raising awareness and promoting international cooperation.</li> </ul> <p><i>Step 4: Application of knowledge</i></p> <ul style="list-style-type: none"> <li>Implement the theoretical knowledge and strategies into into a practical mitigation and awareness plan.</li> </ul> <p><i>Step 5: Evaluation</i></p> <ul style="list-style-type: none"> <li>Assess the sustainability of the efforts, ensuring that the climate resilience measures are durable, cost-effective, and provide long-term benefits to the urban population.</li> </ul>

\* under development the final elements of the framework

### 3. Objectives and Methodologies

Learning Goals and Objectives	<p>After completing the project, students should</p> <ul style="list-style-type: none"> <li>Know the basic principles of the Gulf Stream and its role in climate regulation.</li> <li>Understand the potential impacts of its weakening.</li> <li>Know the principles of oceanic and atmospheric dynamics.</li> <li>Understand the importance of international cooperation in climate change mitigation.</li> </ul>
Learning Outcomes and expected Results	<p>After completing the project students should:</p> <p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Know the basic principles of the Gulf Stream.</li> </ul>

	<ul style="list-style-type: none"> <li>● <i>Understand the potential impacts on global climate and marine ecosystems.</i></li> <li>● <i>Know how to use GIS tools for data analysis.</i></li> </ul> <p><b>Skills</b></p> <ul style="list-style-type: none"> <li>- <i>Perform satellite analysis.</i></li> <li>- <i>Use GIS for data visualization.</i></li> <li>- <i>Conduct mathematical calculations (average, range).</i></li> <li>- <i>Improve presentation and communication skills.</i></li> </ul> <p><b>Attitudes</b></p> <ul style="list-style-type: none"> <li>- <i>Develop an interest in oceanography and climate science.</i></li> <li>- <i>Foster a sense of responsibility towards climate change mitigation.</i></li> <li>- <i>develop interest in STEAME</i></li> </ul> <p><b>Prior Knowledge and Prerequisites</b></p> <p><b>Prior knowledge - skills:</b></p> <ul style="list-style-type: none"> <li>● <i>Basic mathematical calculations</i></li> <li>● <i>Basic knowledge of environment (biology)</i></li> <li>● <i>Basic knowledge of physics</i></li> <li>● <i>Basic use of office applications suite (Microsoft Office, Libre office or equivalent)</i></li> <li>● <i>Basic use of GIS</i></li> <li>● <i>Working in teams</i></li> <li>● <i>Communication and cooperation skills</i></li> </ul> <p><b>Prerequisites:</b></p> <ul style="list-style-type: none"> <li>● <i>Laboratory with access to the web</i></li> <li>● <i>Office suite (presentations, spreadsheets)</i></li> <li>● <i>GIS tools</i></li> <li>● <i>Field work</i></li> <li>● <i>Teleconference platform</i></li> <li>● <i>Presentation equipment (projector/presentation screen)</i></li> </ul>
<p>Motivation, Methodology, Strategies, Scaffolds</p>	<p><b>Motivation</b></p> <ul style="list-style-type: none"> <li>● <i>Discussion on climate change and its global impacts.</i></li> <li>● <i>Real-world application of project results.</i></li> </ul> <p><b>Methodology</b></p> <p><i>Project based approach that presupposes the collaboration between teachers of science, maths and IT and the team work of the students in the project of local weather.</i></p> <p><b>Strategies</b></p> <p><i>Project based learning.</i></p> <p><i>Work in small teams.</i></p> <p><i>Guided discovery</i></p> <p><i>Autonomous work</i></p> <p><b>Scaffolds</b></p> <p><i>Guidance and consultancy</i></p> <p><i>Additional information sources</i></p> <p><i>Computer laboratory access and support</i></p> <p><i>Collaborative development of products and evaluation methods</i></p>

#### 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) 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*

- *ocean currents*
- *marine ecosystems*
- *atmospheric dynamics*

	<p><i>Lesson block 2</i></p> <p><i>T1, T3</i></p> <p><i>Using remote sensing analyses of Gulf Stream patterns</i></p> <p><i>T1, T5</i></p> <p><i>Statistics on climate impacts due to Gulf Stream changes</i></p> <p><i>Lesson block 3</i></p> <p><i>T1, T2, T3</i></p> <p><i>Field observation linking to remote sensing analysis results</i></p> <p><i>Lesson block 4</i></p> <p><i>T1, T2, T3, T4</i></p> <p><i>Studying mitigation measures, creating alternatives and solutions</i></p> <p><i>Lesson block 5</i></p> <p><i>Presentation of the results of the different groups to the teachers</i></p> <p><i>Peer evaluation</i></p> <p><i>General evaluation &amp; feedback</i></p>
Assessment - Evaluation	<i>Evaluation is based on the final product of the students and is carried out by the teachers and the students of the other team</i>
Presentation - Reporting - Sharing	<i>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.</i>
Extensions - Other Information	<i>See version Level 2</i>

# 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
2. Engaging the world of the wider environment / work / business / parents / society / environment/ ethics
3. Target Age Group of Students - Associating with the Official Curriculum - Setting Goals and Objectives
4. Organization of the tasks of the parties involved - Designation of Coordinator - Workplaces etc.

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

##### Preparation (by teachers)

1. Relation to the Real World – Reflection
2. Incentive – Motivation
3. Formulation of a problem (possibly in stages or phases) resulting from the above

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

4. Background Creation - Search / Gather Information
5. Simplify the issue - Configure the problem with a limited number of requirements
6. Case Making - Designing - identifying materials for building / development / creation
7. Construction - Workflow - Implementation of projects
8. Observation-Experimentation - Initial Conclusions
9. Documentation - Searching Thematic Areas (AI fields) related to the subject under study – Explanation based on Existing Theories and / or Empirical Results
10. Gathering of results / information based on points 7, 8, 9
11. First group presentation by students

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

12. Configure STEAME models to describe / represent / illustrate the results
13. Studying the results in 9 and drawing conclusions, using 12
14. Applications in Everyday Life - Suggestions for Developing 9 (Entrepreneurship - SIL Days)

##### Review (by teachers)

15. Review the problem and review it under more demanding conditions

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

16. Repeat steps 5 through 11 with additional or new requirements as formulated in 15
17. Investigation - Case Studies - Expansion - New Theories - Testing New Conclusions

## 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