STE(A)M IT STORIES OF IMPLEMENTATION

Title of your Story

Ocean acidification and its influence on the dissolution of calcium carbonate.

Name of the Author(s)

Edyta Węgrzyn, Karolina Kasperska, Ewelina Słowińska

The Learning Scenario Implemented

Add below the link to the learning scenario you implemented in your class. The link must directly point to the resources on Scientix Repository and STE(A)M IT Website.
http://steamit.eun.org/ocean-acidification-and-its-influence-on-the-dissolution-of-calcium-carbonate/ http://www.scientix.eu/resources/details?resourceId=28403

The Implementation Context

*Briefly describe the context of your implementation, specifying what subject(s) you chose to implement the learning scenario in, how those subjects relate to STEM careers, what was the students' age(s), the size of the group, previous familiarity with real life scenarios, what real-life questions did you choose to address, etc. We aim to gather stories of **classroom implementation**, so the context must appropriately reflect this. (maximum 300 words).*
For the implementation of the learning scenario, we chose the subjects of Biology and Geography, Physics, Chemistry and English. A total of 24 students aged 15 participated in the implementation. The students had some experience with a different STEM learning scenario that was conducted with them in the fall. During our classes following real-life questions were addressed: ○ What are the effects of the massive use of fossil fuels? ○ What are the consequences of our dependence on motor vehicles? ○ Can fossil fuels reduce the amount of food on our plate? ○ Why is the fishing industry economically disadvantaged by shellfish exploitation? ○ Why do limestone monuments / statues show a marked degradation of beautiful architectural details?

The work presented in this document has received funding from the European Union's ERASMUS+ programme project STE(A)M IT (Grant agreement 612845-EPP-1-2019-1- BE-EPPKA3-PI-FORWARD), coordinated by European Schoolnet (EUN). The content of the document is the sole responsibility of the organizer and it does not represent the opinion of the European Union or the Education, Audiovisual and Culture Executive Agency, which are not responsible for any use that might be made of the information contained.

- What is the relationship between fossil fuels, ocean acidification, and calcium carbonate?
- What is the effect of ocean acidification on calcium carbonate dissolution?

The Narrative

What did you do? *Describe how you used the selected learning scenario in your teaching. For example, what was the structure of the lesson activities; did you make any adaptations to the resources? Did you include any online activities in the implementation? (maximum 200 words).*

For the students, the content on the pH of the solutions was new and needed to be clarified. They explained it on the basis of information from the websites provided in the timetable. These classes were held at school. Subsequent classes, also taking place at school, consisted in explaining and discussing the issues related to the consequences of ocean acidification and answering the question - What is the impact of ocean acidification on the dissolution of calcium carbonate? The students learned new words in English and watched videos on YouTube, one of them was included in the resource in the lesson plan, the other video - the animation we were looking for, was chosen by the English teacher. In the same class, the students prepared the experimental sets according to the instructions given in the lesson plan. Their experience in studying the effect of the ocean acidification on the dissolution of shells of crustaceans, which are made of calcium carbonate, was very interesting for them. We had to do the rest of the scenario implementation online as the students partly attended classes, some lessons at school and some at home. Only individual students were allowed to enter the school and check the results of the experiment which had to be performed daily for a week. Online classes consisted of preparing a presentation with answers to the questions.

The Collaboration Process

How did the collaboration with other teachers go? *Please, describe how was working together with the other teachers and what was the approach to carry out the lesson(s). (maximum 150 words).*

All teachers participating in the project participated in the implementation of the class scenario in the first classroom at school, and in the next classes held at school with students, one teacher participated with me and the other worked online, she connected with us on the Teams platform and helped with the classes, for example, discussing movies and animations.

The introduction to the topic and experiment were carried out by the chemistry teacher, the students were supported by the maths teacher by preparing the presentations and the vocabulary and partially the explanation of the acidification process was conducted by the English teacher.

Learning Outcomes

What did you achieve? *Describe the main learning outcomes you achieved with the implementation of the Learning Scenario. Tell your reader about anything that supports your case for achieving these learning outcomes. For example, students' view, or any other evidence[1] that illustrates the benefits and impact of using this Learning Scenario? (maximum 300 words)*
The learning outcomes that have been achieved after the implementation of the learning scenario. They are the multimedia presentations and the effects of the experiment that were very interesting for the students. On the basis of the experience and acquired knowledge, students understand the importance of reducing gas emissions, especially carbon dioxide, because the increase in its concentration has a huge impact on the life of organisms living in water, especially in such a large body of water as the ocean. Ultimately, it all comes down to what students respond to the questions and broader issues *"How can you use the new information in your real life?" "How to disseminate the acquired knowledge, start acting to acidify the oceans", "I have more knowledge about climate change and can take better care of the environment" "I can inform other people about what causes the burning of fossil fuels".*

Teaching Outcomes

What did you, as a teacher, get out of teaching with a STE(A)M IT Learning Scenario and resources? *How did the usage of the STE(A)M IT Learning Scenario go? What should teachers and students watch out for to make effective use of a Learning Scenario created to support the integrated STEM approach? Please also describe your experience in collaborating with teachers of other subjects. What was different from traditional teaching? What advice would you give to another teacher planning to implement the same Learning Scenario about the achievement of the desired learning outcomes? (maximum 300 words).*
The use of this learning scenario was a very interesting and enriching experience for the students as well as for the teachers. The STEM knowledge added up to the civic development of the students. The actual climate changes that are often addressed in the public became even more visible to the students. By the same token, the topic of the effect of the air pollution on the ocean and therefore on their food was an interesting aspect for them. This learning scenario provides a great opportunity to blend subjects together (chemistry, biology, geography, English) without really paying attention to the fact that there are so many of them. It was different from traditional teaching because some of the modules had to be conducted online (or some of the teachers connected

[1] Remember to refer to the point 6 of the guidelines.

online with the students in the classroom). In addition, all of the classes were conducted by a group of teachers who provided support in three main areas of knowledge.
We would advice other teachers to look for more materials about acidifications to make the process clear to the students who have no background knowledge. It is also recommended to check the background knowledge of the students about the effects of the climate change, especially regarding oceans if the students don't live by any water body.

Challenges

Did you face many challenges? *If yes, how did you address them? Tell us more about your implementation issues, obstacles (practical or in relation to your school's organization/resources/environment), communication and planning issues, lack of knowledge, attitude towards STEM, etc. What did you do to overcome these challenges? (max. 200 words)*

While conducting the classes we didn't face any major challenges. The main concern was the hybrid system of the education, which meant for us that not all of our students attended classes in the same weeks. It was especially important because of the experiment and observation which made by the students within a week prior the classes. Due to some restrictions the whole group of the students got to know the results of the experiment but did not accompanied the teacher every day. The chemistry teacher kept the students updated on the experiment results online. This challenge should not apply to any other circumstances than the Covid-19 pandemic.
An interesting insight would be also the fact that our students, who live in Warsaw were not very familiar with the impact of the air pollution and release of the carbon dioxide on the ocean. We had to enrich the presentation with additional infographics and movies.