Europeana Learning Scenario

Title

Smartphone and the periodic table

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Summary

Table of summary	
Subject	Chemistry, Earth Sciences, Geography, Law, English.
Topic	Mendeleev periodic table, mines
Age of students	15-16 (it can also be tested with older ones)
Preparation time	60 minutes
Teaching time	390 minutes
Online teaching material	www.padlet.com The Periodic Table https://ptable.com/?lang=it#Writeup/Wikipedia Information about chemical elements in smartphones https://www.acs.org/content/acs/en/education/resources/highschool/chemmatters/past-issues/archive-2014-2015/smartphones.html https://www.compoundchem.com/2014/02/19/the-chemical-elements-of-a-smartphone/ Minerals Tekniska museet https://digitaltmuseum.se/021026345547/mineral Coltan https://en.wikipedia.org/wiki/Coltan https://en.wikipedia.org/wiki/Coltan_mining_and_ethics Mines https://en.wikipedia.org/wiki/Grasberg_mine http://www.metallirari.com/7-piu-grandi-riserve-terre-rare-pianeta/ Nelle miniere dove nascono gli smartphone - Nemo - Nessuno Escluso 25/05/2017(Italian) https://www.youtube.com/watch?v=WCFKWgu4u1g RAEE https://it.wikipedia.org/wiki/Rifiuti_di_apparecchiature_elettriche_ed_elettroniche http://ec.europa.eu/environment/waste/weee/index_en.htm
Offline teaching material	Periodic table of the elements, World map, paper, glue.
Europeana resources used	History of periodic table https://www.europeana.eu/portal/it/record/9200579/jatmfb7x.html?q=chemical+elements#dcId=154548788339 2&p=1 Silicon https://www.europeana.eu/portal/it/record/9200579/r9dfe269.html?q=Silicon#dcId=1549876899099&p=1

Silver
https://www.europeana.eu/portal/it/record/9200387/BibliographicResource_3000117265729.html?q=Silver#dcId=1549876899099&p=1
https://www.europeana.eu/portal/it/record/9200387/BibliographicResource_3000117301117.html?q=Silver#dcId=1549876899099&p=1
https://www.europeana.eu/portal/it/record/9200387/BibliographicResource_3000117239910.html?q=Silver#dcId=1549876899099&p=1
https://www.europeana.eu/portal/it/record/09411/240955D1524D505EE82AD409B146A83F755D1B0E.html?q=Silver#dcId=1549876899099&p=2
Gold
https://www.europeana.eu/portal/it/record/916107/wws_object_1744.html?q=mineral+gold#dcId=1549876899099&p=1
https://www.europeana.eu/portal/en/record/9200579/byvpq9nz.html?q=gold#dcId=1551709701841&p=1
https://www.europeana.eu/portal/it/record/11622/_MFN_MINERALOGY_MFN_GERMANY_MFN_MIN_2000_7969.html?q=gold+minerals#dcId=1551709856533&p=2
Nickel
https://www.europeana.eu/portal/it/record/09411/0DF71FBAB78001A484E6F2E9216928A740B3993D.html?q=nickel+mineral#dcId=1551710042556&p=1
Antimony
https://www.europeana.eu/portal/it/record/2023901/elm_specimen_image_g27_g27_155_jpg.html?q=antimony+mineral#dcId=1551710042556&p=1

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Integration into the curriculum

"Observation and description of phenomena and simple reactions (their recognition and their representation) with reference also to examples taken from everyday life" and "classification of elements"(MIUR, 2010)

Aim of the lesson

Deepen knowledge on the periodic table developed by Mendeleev and on the structure of the periodic table used today. Be aware of the environmental and social impact related to extraction of the elements contained in a smartphone and the need not to throw away and recycle them;

Trends

Inquiry-based and collaborative learning, STEM, Project-Based Learning.

21st century skills

Environmental literacy: *students learn about mines and their environmental impact;*

Critical thinking and problem solving: *students are aware of the social and environmental problems caused by the extraction of the cellular elements and the needs to recycle them;*

Communication: *students have to communicate the results of their activity;*

Collaboration: *students work together during the activity and prepare the final product.*

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Activities

Name of activity	Procedure	Time
Engage	Students, using the interactive periodic table, have to think about which chemical elements have been used to build their mobile phone and to insert answers on Padlet.	15 minutes
	Teacher and students discuss about the importance of the periodic table and its history.	15 minutes
	Students in group play the game "*Which chemical elements in your smartphone*". Teachers provide to students a scheme to fill in with the correct elements. The correct drawing is projected on an interactive whiteboard, students peer reviewing the work of another group. *The solution is discussed together.*	90 minutes
Elaborate:	Teachers ask students to answer these questions: "*Where do elements of your smartphone come from?*" "*Which minerals are used to extract them?*" "*What about the environmental impact of mines?*" Students search on Europeana to answer these questions.	60 minutes
	At home each student designs a card for one element used to build mobile phones. The card should include: information about the minerals used to extract elements, mines where they came from and their environmental impacts.	120 minutes
	At school students present their cards and place them on a World Map.	30 minutes
	A video about mining of elements used in mobile phone will be showed to students to introduce a discussion about conflict caused by mining of minerals to obtain chemical elements needed in mobile phones.	60 minutes
	Students answer the question: *"You bought a new phone: what do you do with your old one? Do you throw it into the trash or can it be recycled? Students in group look for Italian and European law about waste electrical and electronic equipment (WEEE or RAEE) and prepare billboards about this issue.*	60 minutes
Evaluate	Students present the result of their research with a Power Point presentation.	60 minutes

Assessment

For individual students: Presentation in class of students' researches about mines, Report of all activities on a workbook, Self-evaluation.

For group work: game evaluation, billboards evaluation.

***************************** AFTER IMPLEMENTATION ******************************

Student feedback

The students provided feedback in the written form completing a questionnaire:
Did you like those activities? Why?
Which activity did you like the most?
Did you find any difficulties in looking for information?
Was Europeana helpful for your work?
How did your group work?
Did you find any difficulties?
How did you overcome them?
The students enjoyed all the activities, especially the game, they had some difficulties, but these have been overcame working in group and with the teachers' support. The students feedback was positive because they were interested in this topic and in answering questions about mobile phone which are very important in their lives.

Teacher's remarks

The activity was possible thanks to collaboration of teachers of different subjects.

About the Europeana DSI-4 project

Europeana is Europe's digital platform for cultural heritage, providing free online access to over 53 million digitised items drawn from Europe's museums, archives, libraries and galleries. The Europeana DSI-4 project continues the work of the previous three Europeana Digital Service Infrastructures (DSIs). It is the fourth iteration with a proven record of accomplishment in creating access, interoperability, visibility and use of European cultural heritage in the five target markets outlined: European Citizens, Education, Research, Creative Industries and Cultural Heritage Institutions.

European Schoolnet (EUN) is the network of 34 European Ministries of Education, based in Brussels. As a not-for-profit organisation, EUN aims to bring innovation in teaching and learning to its key stakeholders: Ministries of Education, schools, teachers, researchers, and industry partners. European Schoolnet's task in the Europeana DSI-4 project is to continue and expand the Europeana Education Community.