Europeana Learning Scenario

Title: Exploring electricity?

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Abstract

In this lesson, electricity is introduced by having students identify and talk about what they know about this topic using their experience. The students (aged 15/16) using Europeana resources will learn what electricity is and how we (people) can make electricity. Then the students will learn who Nikola Tesla was and which his role is when we talk about electricity and about its applications. Also they will learn about Tomas Edison, Carl Friedrich Benz, and Alexander Graham Bell. The students will learn about electricity in the service of medicine. They will learn about Luigi Galvani (1737-1798), an Italian physicist who began his researches into electrophysiology in the late 1770s, so students can learn about ‘animal electricity’ - later disproved, this idea stated that the electrical current was produced by living tissues in the body. Using these online resources, they identify the basic components necessary for electricity and electrical current, benefits of their existence, as well as the serious danger connected with ecology issues.

Keywords

Electricity, electrical current, Nikola Tesla

Table of summary

<table>
<thead>
<tr>
<th>Subject</th>
<th>Physics, History of physics</th>
</tr>
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<tbody>
<tr>
<td>Topic</td>
<td>Electrical current</td>
</tr>
<tr>
<td>Age of students</td>
<td>15-16</td>
</tr>
<tr>
<td>Preparation time</td>
<td>60’</td>
</tr>
<tr>
<td>Teaching time</td>
<td>2 x45’</td>
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</table>

1. Using Historiana in the section about teaching and learning titled “Giants of industrial revolution” where students learn about four of the most important inventors of the period from the late 18th to early 20th centuries during which many technological and economic advances were made, contributing to the rapid growth of industry across the world.
2. Web tool **Socrative** for online quizzes to assess students' knowledge after the use of Europeana resources for electricity and for scientist Nikola Tesla;

<table>
<thead>
<tr>
<th>Offline teaching material</th>
<th>No</th>
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<tbody>
<tr>
<td><strong>Europeana resources used</strong></td>
<td>Europeana resources used for this learning scenario:</td>
</tr>
<tr>
<td></td>
<td>1. Electricity in service of medicine</td>
</tr>
<tr>
<td></td>
<td>2. <a href="https://www.europeana.eu/portal/record/europespace_261360">Museum of electricity</a>, <a href="https://www.europeana.eu/portal/record/europespace_191577">Power station tour</a> and <a href="https://www.europeana.eu/portal/record/europespace_271860">Museum of Art, Architecture and Technology</a></td>
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<td></td>
<td>3. <a href="https://www.europeana.eu/portal/record/europespace_217189">Metallic arc by Luigi Galvani</a></td>
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<tr>
<td></td>
<td>4. <a href="https://www.europeana.eu/portal/record/europespace_319264">Nikola Tesla with his equipment</a></td>
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<tr>
<td></td>
<td>5. <a href="https://www.europeana.eu/portal/record/europespace_235650">Illustration of a galvanic electric machine</a></td>
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<tr>
<td></td>
<td>6. <a href="https://www.europeana.eu/portal/record/europespace_235650">Electricity production (Wind rotor-side view)</a> and <a href="https://www.europeana.eu/portal/record/europespace_194506">Wind rotor - top view</a></td>
</tr>
</tbody>
</table>

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**Integration into the curriculum**

The topic of this learning scenario about electrical current and electrical energy is fitting very well into our national curriculum. Namely our students aged 15 or 16 during their second grade in the high school education learn about these topics according to the physics curriculum. But also this learning scenario is suitable according to the history curriculum, if students create for instance some project work about life and work of magnificent and extraordinary scientist Nikola Tesla who is known like father of the electrical current.

**Aim of the lesson**

By the end of the lesson with my students I would like to achieve my students to learn about the elementary features of electrical current. Most important of all I would like my students to realize how important Nikola Tesla is for all possibilities that we have today which are connected with electricity and its applications.
Outcome of the lesson

The results of the lesson objective will be presented with the results of the quizzes which will be conducted at the end of the learning process.

Trends

Collaborative Learning: a strong focus on group work.

Visual Search & Learning: images and multimedia are more powerful than verbal stimuli.

Peer learning: students learn from peers and give each other feedback.

STEM Learning: Increased focus on Science, Technology, Engineering, Mathematics subjects in the curriculum.

21st century skills

- Collaboration and teamwork;
- Creativity and imagination;
- Critical thinking;
- Flexibility and adaptability;
- Technology skills;
- Social skills;

Activities

<table>
<thead>
<tr>
<th>Name of activity</th>
<th>Procedure</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation</td>
<td>One week earlier students were given homework by the teacher to research the topic of electricity, electrical current and find out who Nikola Tesla was.</td>
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<tr>
<td>Questions for the start</td>
<td>The teacher asks students questions about whether they know what electricity and electric current are? Then he asks them if someone ever has had some experience in her life with static electricity? Then he asks them what they know about conductors, semiconductors and dielectrics? Then asks what they think of the conditions that need to be met in order for electricity to flow through the conductors? The teacher asks similar questions to determine the previous experience of the students? The teacher also asks the students if they know who Nikola Tesla was? Teacher is asking questions to determine the cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. A discussion on electricity is developing...</td>
<td>20 min</td>
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</table>
### Introduction to the topic
Teacher is presenting learning activity from the historian web site titled "Giants of industrial revolution" from which students learn about the most important scientists from the late 18th to the early 20th centuries. After that they will leave comments here about the most important scientists and their inventions and the importance of each invention in student's daily lives. Students work in pairs.

### Activity 1
Teacher present in front the students resources about electricity from Europeana pro and the main site of the Museum of Art, Architecture and Technology And also he/she present electricity production and the other link for electricity production And teachers give time to students to explore them working in pairs and after that they present their findings.

### Activity 2
Task to explore Europeana website about “Metallic arc used by Luigi Galvani”

### Activity 3
Task for the students to explore site “Nikola Tesla with his equipment for”, then “illustration of a galvanic electric machine” Presentations of the findings from the students.

### Activity 4
Teachers use web tool Socrative for online quizzes to assess students' knowledge after use of Europeana resources for electricity and for scientist Nikola Tesla and after the use of these resources and students answer the questions.

### Feedback, discussion and conclusions
With the application “Socrative”, the results of the students' quizzes (knowledge testing) after using the resources of Europeana are immediately apparent, so this section develops a discussion of this way of learning and the results achieved.

## Assessment
Teacher will develop a quiz using the application Socrative and will assess knowledge of the student gained from activities mentioned above.

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

## Student feedback
The teacher conducts online quizzes with the online application Socrative, so students used their smart phones and this was an activity that was interesting for them. Immediately they got the results of the quizzes and most of them were very pleased with the excellent results, but all agreed that the classes with Europeana were wonderful and that these resources are precious.
Teacher’s remarks

The students explored the topic of electricity, electrical current and about scientist Nikola Tesla on the internet.

After that we have had questions/answers section to find out what they actually know about these topics. I realized that they know just some elementary facts and they are not sure about some features of electricity.

Then we started the activities of learning using Europeana and the other resources according to the Learning Scenario “Exploring electricity”. They worked together in pairs during exploring the Europeana resources and after that they presented their findings. In fact the students were very interested and active. With this cooperation, they have enhanced their communications skills and their language competencies and together have developed their awareness about what actually electricity is and how it is important. With this activity the interest and the creativity of the students was engaged to a high level and their cooperation resulted in a very good social and scientific output.

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.