

Europeana Learning Scenario

Title

Numbers in the Dark

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Abstract

The project combines mathematics and other disciplines in order to raise awareness about people with visual impairment. The first part of the project was implemented during the lessons of Mathematics. The task for the students was to research the Braille alphabet and techniques of writing numbers. The second part was to explore the real-life application of the Braille alphabet. This was a homework task where students had to find examples of the Braille alphabet in the real life. The third part was to apply knowledge about the Braille alphabet and to use the 3D printer to print items suitable for people with visual impairment. The aim of the project is to raise awareness about visual impairment through regular lessons and activities. The students who took part in the project were 14-15 years old.

Пројекат комбинује математику и друге дисциплине да би повећали свест о људима који имају проблем са видом. Први део пројекта је био имплементиран на часовима математике. Задатак ученика је био да се истражи Брајева азбука и технике писања бројева. Други део је био истраживање истраживање реалних ситуација примене Брајеве азбуке. Трећи део је била примена знања о Брајевој азбуци и употреба 3Д штампе да би се штампали предмети који могу користити људи који имају проблем са видом. Циљ пројекта је да се подигне свест и знање о људима који имају проблеме са видом кроз регуларне наставне активности. Ученици који учествовали у пројекту су били узраста 14-15 година.

Keywords

interdisciplinarity, numbers, visual impairment, 3D printing

Table of summary

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Subject	Mathematics
Topic	Numbers in Braille's alphabet
Age of students	14-15 years
Preparation time	45 minutes
Teaching time	2 lessons x 30 minutes due to the COVID-19 pandemic
Online teaching material	https://www.thingiverse.com/thing:2731132 https://en.wikipedia.org/wiki/Braille



	https://brailleworks.com/wp-content/uploads/2015/12/Braille-Works-Alphabet-Card-Tagged-Page-1.pdf https://braillebug.org/braille_print.asp
Offline teaching material	Paper, crayons, 3D printer
Europeana resources used	Resource 1 Resource 2

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Integration into the curriculum

Mathematics – students who are 15 years old. An introduction to linear equations. Those lessons deal with numbers and story about Braille's alphabet and how to write numbers.

Aim of the lesson

- Research about Braille alphabet
- Learn technique of writing numbers in Braille alphabet
- Research about real-life application of Brailles alphabet
- Learn 3D printing
- Raise awareness about visual impairment

Outcome of the lesson

- Students learn how to write numbers in the Braille alphabet
- Students discover places where is Braille alphabet used
- Students prepare files for 3D printing
- Students show empathy towards people with visual impairments

Trends

- Lifelong Learning: learning continues outside of school. Connecting learning content with real-life application. Exploring different sources to find useful information.
- Collaborative and interdisciplinary learning: connecting different subjects.
- Use of 3D printing as modern technology in everyday use and to produce useful objects.

21st century skills

- Learning skills: Critical thinking, Creativity, Communication, Problem Solving.
- Life skills: exploring different sources, of information.
- Social skills: communication, empathy.

Activities

Name of activity	Procedure	Time
Active learning with Europeana	<p>The first activity is based on learning about numbers and questions about how numbers can be presented to people with visual impairment. Students explore the Europeana resources</p> <p>https://www.europeana.eu/en/blog/louis-braille-and-the-braille-alphabet https://www.europeana.eu/en/blog/before-braille-raised-type-in-europe</p> <p>Students get information about the Braille alphabet. Using those information students learn about development of Braille alphabet and its significance.</p>	Lesson 1 20 min
Class discussion	<p>Teacher prepare materials with Braille alphabets so students can see how to write letters and numbers. Students write expressions in Braille alphabet. Students write numbers written in Braille alphabet in their notebooks.</p> <p>For example, students had following tasks:</p> <ul style="list-style-type: none"> • Write your name in Braille alphabet • Write your telephone number in Braille alphabet • Write a secret message in Braille alphabet and give it to your friend to read it. • Write a mathematical expression using Braille alphabet and give it to your friend to solve it. Students write mathematical expressions using the Braille alphabet. <p>Students discuss where they have ever seen the Braille alphabet. Teacher is encouraging to remind where they can find the implementation of Braille alphabet. Their homework is to find examples of the Braille alphabet in real life.</p>	10 min
Class discussion	<p>Students discuss where they have seen real-life examples of the Braille alphabet. For example, numbers in the elevators are written in Braille alphabet. Names of medicines are written in Brailles alphabet. Students are encouraged to bring objects with written expressions in Brailles alphabet, so at this part student together with teacher are discussing homework. Students can also bring photos of the objects that they have noticed in their surrounding that have written expression in Braille alphabet.</p> <p>After this short discussion, teacher is directing the other task.</p>	Lesson 2 10 min
3D-print	<p>Students discuss where they have seen real-life examples of the Braille alphabet. For example, numbers in the elevators are written in Braille alphabet. Names of medicines are written in Brailles alphabet. Students are encouraged to bring objects with written expressions in Brailles alphabet, so at this part student together with teacher are discussing homework. Students can also bring photos of the objects that they have noticed in their surrounding that have written expression in Braille alphabet.</p> <p>After this short discussion, teacher is directing the other task.</p>	20 min

Name of activity	Procedure	Time
<p>The other task is focused on producing objects that could help people with visual impairments. Teacher starts discussion about how could students help people with visual impairments. After students' suggestions teacher give an example of 3D printed objects that could be made with help of the school on 3D printer. In our case, students agreed on the idea that some kind of toy would be useful for students with visual impairments, so they chose to 3D print dice with numbers written with Braille alphabet.</p> <p>Teacher assisted the process of preparing files for 3D printing. In that part students used resources from www.thingiverse.com</p>		

Assessment

Students had individual homework to explore the environment and find examples of Brilles alphabet around them.

Students also explored how to 3D print objects that can be used for people with visual impairment.

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

Student feedback

During the in-class discussion, the students discovered and expressed their opinions about the work, their feelings and emotions about the project.

Students learned about the way how people with visual impairment learn mathematics. They also explored what they know about the Braille alphabet from their surroundings. The students responded very well since they learned about real-life situations.

Teacher's remarks

It is always good to connect real-life and content that students learn. On this occasion, students had the opportunity to learn about visual impairment. In my opinion, students learn mathematical topic when they are connected to a real life situations.

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.



Students explore how to write numbers with the Braille alphabet.



Students brought medicine boxes where the text is written with the Braille's alphabet.



Students find the numbers written in Braille's alphabet in the elevator in the building.



Students printed a die with a 3D printer that has numbers written in Braille's alphabet.

