Europeana Learning Scenario

Title

Pioneers Exhibition in Math class

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Abstract

Based on Europeana Pioneers Exhibition, students are divided into groups (three or four students) to investigate the lives and achievements of remarkable European women in the arts, sciences, and society. They have to create real-world problems related to these historical events. Students must read and select historical information relevant to their statements, contextualizing the mathematical problem constructed from real data. The final product of each group is a quiz with these exercises to be tested in class. Each group assesses their peers' work and have their work evaluated by peers. Finally, they organize a competition in school launching their quizzes to other students and classes, in while they are celebrating the Women's Day, on 8 March.

Keywords

Maths; Pioneers Exhibition; Women's Day; Interdisciplinary; Problem-solving

Table of summary

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Subject	Mathematics or Interdisciplinary lesson (Mathematics, ICT, Science, Arts and subjects related to Social Studies)
Topic	This lesson fits in the Mathematics curriculum for the seventh grade (solving linear equations in one variable).
Age of students	12- 15
Preparation time	3 hours
Teaching time	6 hours: • 1 Mathematics or Interdisciplinary Session (50 minutes) – To explain the project, to create groups, to presents “Pioneers Exhibition» of Europeana and to start to create the problems. • 2 Mathematics Sessions (50 + 50 minutes) – Groups create their quiz (2 or 3 problems) based on an exciting aspect of "Pioneers Exhibition": they have to create the problems and solve it by a linear equation in one variable. • 1 Mathematics Session (50 minutes) – To launch the quizzes to the class and peer feedback for review. • 1 Mathematics or Interdisciplinary Session (50 minutes) – To finalize their quizzes.

Co-financed by the Connecting Europe Facility of the European Union

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	• 1 Interdisciplinary Session (50 minutes) – To organize a competition in school to launch the quizzes to other students and classes, in a while to celebrate the Women's Day, on 8 March.
Online teaching material	• International Women's Day, https://www.un.org/en/events/womensday/history.shtml • 7 Ted-Ed Lessons to watch on International Women's Day, https://blog.ed.ted.com/2014/03/07/four-ted-ed-lessons-to-watch-on-international-womens-day/ • Padlet https://padlet.com/ - online platform where students can share ideas about the work they will create. • Socrative, https://socrative.com/ - online platform where students can create and launch their quizzes. • Mentimeter https://www.mentimeter.com for voting and feedback. • 21 CLD Student work rubrics, http://fcl.eun.org/tool5p2
Offline teaching material	• Tools to organize the exhibition "Women pioneers" • Textbook, paper, poster board, colored pencil, glue, etc. • Tablets • Smartphones to create video explanations
Europeana resources used	• Exhibitions Pioneers, https://www.europeana.eu/portal/en/exhibitions/pioneers/maria-sklodowska-curie • Pioneers Credits, https://www.europeana.eu/portal/en/exhibitions/pioneers/credits

Licenses

Integration into the curriculum

Mathematics: This lesson fits in the Mathematics Portuguese curriculum for the seventh grade:

- Solving linear equations in one variable using standard algebraic properties.
- Problem-solving involving linear equations in mathematical and non-mathematical contexts, adapting, designing and implementing varied strategies, discussing the found solutions and the processes used.

Aim of the lesson

In this lesson, students will be able to:

- Recognize the importance of women's historical contributions, knowing relevant facts about remarkable European women in the arts, sciences and society
- Create real-world problems leading to linear equations in one variable.

- Create a digital product for authentic users
- Celebrate International Women's Day

Outcome of the lesson

Students will create quizzes of problems related to Exhibition Pioneers leading to linear equations in one variable.

Trends

Students as Creators: students become more active producers and publishers of educational resources.

Collaborative Learning: a strong focus on group work.

STEAM Learning: Increased focus on Science, Technology, Engineering, Arts, Mathematics subjects in the curriculum

21st century skills

- **Content knowledge and 21st-century themes:** This learning scenario focuses on Mathematics to promote an understanding of academic content by weaving interdisciplinary themes.
- **Learning and Innovation Skills:** Students need to collaborate, have critical thinking, being creative and innovative to create their problem and solve it, and to explain and communicate the results.
- **Information, Media and Technology Skills:** In this project, students have to use ICT tools to research, organize, create and present their findings.
- **Life and Career Skills:** Students have to produce a product, respect deadlines, collaborate with a team and know how to explain their ideas. These activities are essential to developing thinking skills, content knowledge, and social and emotional competencies.

Activities

Name of activity	Procedure	Time
1) Dream	1. Teachers, to inspire students, ask them to read and look at the "Pioneers Exhibition" on Europeana platform and highlight the importance of celebrating the historical contribution of innovative women in our culture. - Why did we celebrate International Women's Day in many countries around the world? Do you know something about the achievements of these eight women from the "Pioneers Exhibition"? 2. The teacher presents the main ideas of the LS to the students and gives them time to browse the Europeana portal (to explain how to search for information). 3. During the lesson, the teacher discusses the learning activities process, the schedule, and negotiate the assessment criteria with the class. 4. Form teams – Students form teams (three or four students). They discuss and vote (e.g. using Mentimeter) their favourite topic based on "Pioneers Exhibition". Students are grouped according to these interests but also	50 min

Name of activity	Procedure	Time
	considering their differences, to create heterogeneous functional teams. The teacher ensures they form balance groups. 5. Support students - The teacher provides an online quiz (e.g. "space race" from "Socrative") based on "Pioneers Exhibition" to focus students on Maths as the subject for the game. Each group answers the online quiz to solve the problems by a linear equation in one variable. 6. Teamwork: - They start to explore information about "Pioneers Exhibition" and select historical data relevant to create the first problem. - Reflection - Students use Padlet to post and record reflections (1 minute) to document their work. Each recording should answer three points: (1) What we have we done ? (2) What will we do? (3) Any problems? They must pay attention to copyright issues regarding the data they collect.	
2) Explore and create	1. The teacher reviews the work of each team and their reflection to provide feedback and support to the process of problem-solving and creation. 2. Teamwork: - Students continue reading information on "Pioneers Exhibition" to select historical data relevant to their problems. - They start to create a prototype of quiz problems (2 or 3 exercises). - They have to solve the problems through a linear equation in one variable. - During the class, the teacher will discuss and clarify with the groups their mistakes and miscalculations. - Each group creates an account in Socrative to edit and add their quiz. - Students have to create their questions and quizzes to launch a mini-competition in class. - They have to share the Socrative quiz code to the teacher. - Reflection - Students use Padlet to post and record reflections (1 minute) to document their work. Each recording should answer three points: (1) What we have we done? (2) What will we do? (3) Any problems?	50 min + 50 min
3) Ask Peer – Feedback	1. The teacher reviews the work and reflection of each team to provide feedback and support to the process of problem-solving and creation. 2. Teamwork:	50 min + 50 min

Name of activity	Procedure	Time
	- Each team launches their quiz to the class. Everyone has to solve the other groups' challenges and give and receive peer-feedback to improve their work. - The first group starts their quiz and waits for the results. After that, the second group starts, etc. - During each test, the groups write and solve the problem in their notebooks, compare results and help each other (peer feedback), to seek the right answer. They must submit a single representative reply to the group. - In the end, students could observe the scores and the details of their answers. The teacher will discuss and clarify with the students their mistakes and miscalculations. - Reflection - Students use Padlet to post and record reflections (1 minute) to document their work. Each recording should answer three points: (1) What have we done? (2) What will we do? (3) Any problems?	
4) Remake and reflect	1. The teacher reviews the work and reflection of each team to provide feedback and support to the process of problem-solving and creation. 2. Teamwork: - Students have to remake and finalize their quizzes based on feedback from teacher and peers. 3. Reflect – The teacher uses Mentimeter to ask students to provide feedback about the work they have just developed. What students think about using the Europeana content for the creation of problem-solving with equations? Do they learn about math? Were they inspired by the remarkable achievements of those European women? Is he actual content relevant for a math class? How were these activities important concerning learning and knowledge acquirement? - They could use Padlet to post the reflection (writing or making a video or recording audio).	50 min
5) Show	1. To celebrate the Women's Day, on 8 March, the teacher and students organize a mini-competition in school to launch the Socrative quizzes to other students and classes in school (e.g., mathematics students of 7th grade). - They could integrate this activity in other School activities to commemorate Women's Day. - They share the test codes or rooms codes to provide the participation of the other students at the school. - These online quizzes are open for a day or a week. - The quizzes could be resolved at home, during class time, or continuing after one lesson.	50 min

Name of activity	Procedure	Time
	2. Evaluation: - Math teachers (e.g., mathematics teachers of 7th grade) can follow, in real-time, the progress of the students, facilitating the monitoring of the process. - Each group does a self- evaluation based on rubrics: Collaboration; Real-World Problem-Solving and Innovation; Use of ICT for Learning. - These rubrics have the potential to help students develop understanding of the topic at hand and different kinds of 21st-century skills.	

Assessment

What do students produce when they complete a learning activity?

A "Student Work Rubric" uses big ideas to help teachers to assign a number from 1 to 4 (or 5), according to how strongly the student work demonstrates the given skill. This purpose is to help educators identify, understand and build learning activities that allow students to develop 21st-century skills.

In this project, we propose three rubrics developed by the Innovative Teaching and Learning (ITL) Research project to help the teacher to evaluate and promote skills of "collaboration", "problem-solving and innovation" and the "use of ICT for learning".

For "problem-solving and innovation" the rubric examines whether students' work demonstrates problem-solving and the use of data or situations from the real world. The strongest student work for this rubric demonstrates that the student:

- did not already know a response or solution to the task;
- developed a successful solution to a real-world problem;
- innovated by putting into practice his or her ideas, designs or solutions for others.

(Real-World Problem-Solving and Innovation: Student Work Rubric)

Student feedback

During the process, students record, post and share reflections of project progress, challenges and future steps. They practice self-reflection and responsibility ("what I know and what I need to work harder"). Teacher and students could listen to students' recordings. The students slowly create and share a collection of problems based on Europeana content, which can be used after the project ended. They launch their quizzes to solve, to discuss and to give peer-feedback. The teacher provides feedback and support to the creation and problem-solving. When he is monitoring the process, he has a better understanding of the preparation and engagement of his students. He uses rubrics to help teamwork and students to develop an understanding of the topic at hand and different kinds of 21st-century skills.

At the end, the teacher uses Mentimeter to ask students to provide feedback about the work they have just developed.

What do students think about using the Europeana content for the creation of problem-solving with equations? Do they learn about math? Were they inspired by the remarkable achievements of those

European women? Is he actual content relevant for a math class? How were these activities important concerning learning and knowledge acquirement?

Teacher's remarks

After the implementation, the teacher could use learning analytics of "Socrative" tool to have a better understanding of the preparation of all students participants. The results could be useful to support and implement new Europeana scenarios in the teacher class or school.

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.

Annex

Rubrics for Assessment

Assessment	% final mark	5	4	3	2	1
Collaboration (teamwork) observation	30%	Students are sharing responsibility fairly They are making substantive decisions together Their work product is interdependent. (Collaboration: Student Work Rubric)	Students are sharing responsibility fairly They are making substantive decisions together But their work product is not interdependent. (Collaboration: Student Work Rubric)	Students are sharing responsibility fairly But they are not making substantive decisions together. (Collaboration: Student Work Rubric)	Students are working together But they are not sharing responsibility fairly. (Collaboration: Student Work Rubric)	Students are not working together in pairs or groups. (Collaboration : Student Work Rubric)
Real-World Problem-Solving and Innovation (teamwork) observation	40%		The student's main effort was problem-solving The solution did address a real-world problem The solution was successful The students did innovate. He or she did implement a solution in the real world. (Real-World Problem-Solving and Innovation: Student Work Rubric)	The student's main effort was problem-solving. The solution did address a real-world problem. The solution was successful. But they did not innovate. He or she did not implement a solution in the real world. (Innovation requires putting students' ideas or solutions into practice in the real world).	The student's main effort was problem-solving. But the solution did not address a real-world problem (e.g. did not involve the use of actual data like historical event) or The solution was not successful. (e.g. the solution have unrealistic assumptions or obvious misstatements of fact)	The student's main effort was not problem-solving. (e.g. Students did not have to develop any solutions. They were not addressing a defined challenge.) (Real-World Problem-Solving and Innovation: Student Work Rubric)

Assessment	% final mark	5	4	3	2	1
Use of ICT for Learning (teamwork) observation	30%	Student work demonstrates use knowledge construction supported by ICT The ICT was required for constructing this knowledge Students designed a product that demonstrates attention to authentic users in its design. (Use of ICT for Learning: Student Work Rubric)	Student work demonstrates knowledge construction supported by ICT The ICT was required for constructing this knowledge But students did not design an ICT product for authentic users. (Use of ICT for Learning: Student Work Rubric)	Student work demonstrates knowledge construction supported by ICT But students could have constructed the same knowledge without using ICT. (Use of ICT for Learning: Student Work Rubric)	Students used ICT But the work does not demonstrate knowledge construction supported by ICT. (Use of ICT for Learning: Student Work Rubric)	Student work does not demonstrate ICT use. (Use of ICT for Learning: Student Work Rubric)