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***Creating an ECO online Natural Fit Virtual Programs to Prepare Students for boostIng 21st century Skills 4 the Future (UNITY)***

***2021-1-SE01-KA220-SCH-000032448***

***STE(A)M-focused PBL for transferring 2021st skills for fighting against climate change***

***Lesson Plan Preparation Guide***

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***INSTRUCTIONS:***

**General guidelines:**

1. **Suggested length of the lesson**: approximately 2-4 pages
2. **Front page**: standardised for all– please add your Country in (PARTNER COUNTRY)
3. **Table of contents**: already generated, shall be updated upon completion of all plans’ chapters and sections.
4. The text in each Section shall present, discuss and interpret the main focus of the lesson
5. **Text layout**:

***Fonts***:

* Chapters’ titles: Times New Romans (body), size 14;
* Sections’ titles: Times New Romans, size 11;
* Text: Times New Romans, size 11.

***Spacing***:

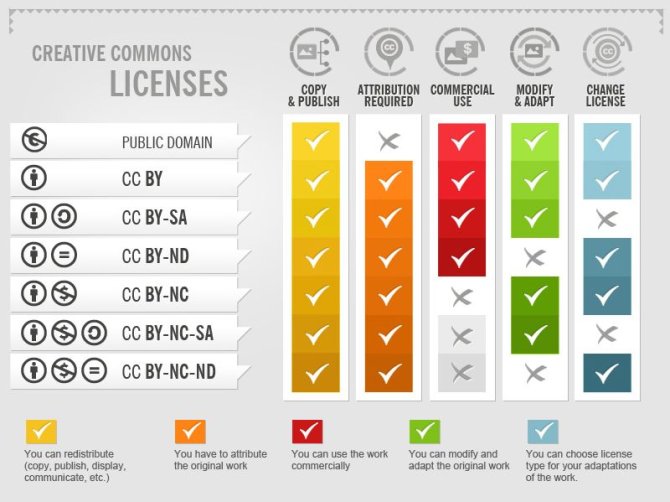
* Line-spacing: 1.15 pt.

***Page margins****:*

* Top: 2.5 cm;
* Bottom: 2.5 cm;
* Left: 2.5 cm;
* Right: 2.5 cm.

**As preparing the lesson plans, please follow the below defined informations and rules:**

* Prepared lesson plans should authentic enough.
* Prepared lesson plans should include high-quality info-graphics, including tables, drawings, pictures, etc. However, the used info graphics cannot be taken from google visuals. It means that when we create lesson plans, we pay attention Common Creative License (CCL):

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**SCOPE OF THE LESSON**

The scope of the lesson should include ‘**’STE (A) M-focused PBL for transferring 2021st skills for fighting against climate change’’** Our students can apply lessons from STEAM classes to a local issue, which is linked to the global climate change: Though different in numerous ways, social studies STEAM classes complement one another. Social studies can bring empathy to the problems STEM can solve, and teachers can showcase the relationships between STEAM, history, and justice while highlighting the standards through a STEM-focused PBL in order to find and or bring solutions towards a global issues.

**STEAM-focused PBL lessons should include the following components:**

* **Planning:** In planning the lesson, it should be considered that well-planning can better engage the students and teachers in real-time learning.
* **Problem and empathy correlations:** Identification of a real-problem and correlation it with an issue that the community have had, makes sense to engage students in real learning experience: A complex problem, driving question, interesting puzzle, or perplexing dilemma drives STEAM-focused PBL. When considering the empathy work of a politician, students may explore the question of what really happens in the political side. E.g. students can examine primary sources to understand what happens in assembly in terms of decision making in climate change, what regulations do the politicians promote to mitigate the climate change…
* **Prototyping:** Connecting the planned lesson and or session with a real-life issue.
* If possible original info-graphics
* **Authenticity (Roleplaying):** Authenticity is a key element of STEAM-focused PBL and teachers can use to create more meaningful learning experiences: Rather than maintaining the traditional student role, STEAM focused PBL has the potential to position students in other real and meaningful roles. Students could take on the role of a mathematician and create mathematical models to make predictions, or an investigative journalist to identify and vet sources as they piece together a puzzle and communicate a story. However, merely telling students that they’re taking on an authentic role doesn’t make it true for them. To make it real, students need support in doing the authentic work of those roles. **E.g.** It’s important for students to learn how to make predictions and observations like a politician, or how to critically analyse a primary source like a historian. Teachers can model these practices, help students break them down to make them more accessible, create plenty of opportunities to practice, and provide ongoing feedback to students as they practice doing authentic work within their role.
* **Diverse point of view and coming up with different but interrelated solutions:** Diverse voices in learning process can happen if diversity and or different learning style is considered: In our everyday classes, we all know that we have students who have diverse learning style. E.g. our students have different learning styles, is known as ‘’multiple intelligence’’ that each has diverse learning style.

**Comments:** Please add your comments in the box below (max 150 words).

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In the following PBL, which is shown on how to utilize the design thinking process, social studies teachers can engage students in a problem of justice that have deep historical roots and whose solution required a STEM focus.

**Subject:** Combining Social Studies and STEM in a PBL

**Step one:** A history teachers at the school should brainstorm a variety of problems in the community that would intersect STEM and history. The lack of sidewalks in the local area emerged as a challenge that cast a long shadow. In planning the PBL, speak with a variety of community partners, including a professor of urban planning at the, an engineer, and local politicians. Each student should provide invaluable insight into the issue.

**Step two:** To understand the problem and its impact, students should be asked: Who rides the public transit bus in the community, and how do they get to a bus stop safely? Students should compare a map of the bus routes and a map of the current sidewalk system, looking for gaps. Students should be led to find the solutions between a person’s home and the bus stop often have no sidewalks. It became clear that the place is automobile dependent, and the guiding question became, “Why there is sidewalks?”

**Step three** To gain historical context, students should use at the local area to look up the ages of five homes on a road with sidewalks and five homes on a road without sidewalks in the community. Students quickly will realize that homes built before building sidewalks, whereas homes built post do not With this historical understanding, students will see how suburbanization and the rise of the automobile in 2022 continued to impact their community. Being concerned about this problem is humanities driven, but solving this problem meant turning to STEM.

**Step four:** (Investigation**):** Group of students should conduct a research under the guidance of their social studies teachers that the students should speak with the urban planners and or local governors about the town/city history with regards to city/town budget for new sidewalks, how the city/town councilors and or authorities identify where to construct new sidewalks, under what circumstances, and also careers associated with sidewalk construction. **E.g.** On average, the city budgets about € 1 million per year for new sidewalks. However, under what circumstance is the budget spent, how many km sidewalk is to build by using the budget. Up to now research and mathematics skills are emerged. Another group of students should coin the study, and come up with a rubric and share it with the rest of the group: for ranking roads for new sidewalks with limited funds: Does it connect existing sidewalks, does it connect to a bus stop, is it within the parental responsibility zone of a school, and is the road dangerous to walk? Lastly, the students should discuss careers associated with sidewalk construction, from civil engineer to surveyor to construction worker. This appealed to the majority of students, from mathematical gurus to those just wanting to work with their hands.

**Step five:** In groups, students should began imagining various solutions to the lack of sidewalks, with the goal of producing a prototype that could solve the problem to present to people. Students should discuss possible solutions, such as raising property taxes, philanthropy, looking for grants from the state government, using municipal bonds, and reprioritizing the city budget. Students should dig into the City/town budget and research businesses that move to areas with robust public transportation networks because an investment in sidewalks can lead to economic growth. The groups had better the choice of how they want to present their solution. For the prototype, students should include an understanding of the problem, how they would rank roads for new sidewalks, the economic impact of sidewalk construction, a road they would prioritize for new sidewalks, and how to pay for it. Most groups chose a PPT presentation and included pictures of people walking local roads that don’t ‘have sidewalks.

**Step six:** After days of research and prototype creation, groups test their presentation with the class, with each group member having a defined role in the presentation. Students analyze each presentation regarding its feasibility and then voted on the best group presentation that would represent the class to the local politicians coming to campus. A major hurdle to PBLs is getting community involvement. In this project, the aim is to have a county commissioner in the morning and a city/town councilor in the afternoon hear student presentations. After listening to all student presentations, these student who have politicians role, feedback, from adjusting monetary figures on new sidewalks to the reality of urban sprawl to congratulating students on picking a road that the city have already chosen for new sidewalk construction. Social studies and STEM complement each other and can work together in more ways than we initially realize. The lack of sidewalks is connected to obesity, pollution, and urban planning, to name a few links.

**IDENTIFICATION OF THE LESSON**

When identifying the STEAM-focused PBL lessons for a specific purpose(s), it should be noted that interdisciplinary learning and blended/hybrid model teaching and learning should be included. In doing so, the following questions should be considered?

* Does the planned lesson cover at least two of the compulsory lessons, e.g. Maths-social studies, science and art, etc., if so, how does the lesson link to and or connect to each other?
* How do the lesson connect in real-life issues?
* What are the readiness of the students in terms of climate change STEAM and PBL?

**Comments:** Please add your comments in the box below (max 150 words).

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**CREATING A REAL-LIFE LINKED CASE FOR THE LESSON**

FAQ: What is case study?

A case study is described as an intensive, systematic investigation of a single individual, group, community or some other unit in which the researcher examines in-depth data relating to several variables (McKinney 1982)

A case generally starts with the followings:

* What if?
* If you were?
* How would you?

In order to create a STEAM-focused PBL, creating a case is essential. A case study, which is to be added in the lesson, should include the following components:

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| Key(s) for the case study | Student-led, in both cases. |
| Number of teaching staff and students engaged: | 1 teacher and 21 students |
| Mandatory or optional: | Optional, in both cases. |
| Engagement approach used: | * A classroom-based approach. During Covid-19, moved to a digital approach, delivering lectures online and a group presentation and discussion exercise. * Classroom-based approach with a mix of content delivery (one hour) and then discussion (one hour). * Role playing approach. |
| Discussion and or engagement time | 15-20 min |

**Content of the case:**

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| Problem | *Climate change* |
| Question | *What would you do, if…?* |
| Objection (reasoning) | *How do you decide….?* |
| Diversity | a-b-c-d-e learning styled students included |

E.g. the climate change is the realty of today and the biggest danger for the future:

Role playing approach:

* You are politicians, what would you do towards the issue?
* You are scientist, what would your solutions be towards the issue?
* You are artists, what art-works would you do towards the issue?
* You are journalists, what campaign and or article would you write/implement towards the issue?
* You are engineers, what engineering solutions would you bring towards the issue?

A case study enriches the learning.

**LESSON PROCEDURE**

STEAM-focused PBL lesson implementation procedure is different than standard lessons. It means that typically, a standard lesson is composed of PPT approach (Presentation Practice Production). However, STEAM-focused PBL lessons composed of PPTPE (Presentation, Practice, Testing, Production and Evaluation).

The STEAM-focused PBL lessons should be followed the following strategies:

Students derive the driving question from multiple contexts or multiple issues within a context. Students work together in this strategy to determine the key challenges facing Indigenous contents. Next, they develop core questions they want to answer and determine what they need to learn to answer those questions.

The general strategy looks like this:

* Students learn about changes to the problem content (this could be via reading multiple news reports, listening to daily podcasts, or engaging with actual people in the field).
* In small groups, students share their key understanding of the changes and how that impacts their current understanding and strategy.
* Students determine key “need-to-knows” they have and work with the teacher and peers to gain competencies.
* Students plan for multiple contingencies and tentative solutions.
* Students have a mid-lesson stop in which they have 5 minutes to prepare to present their current work.
* Students conduct a feedback protocol (tuning or critical friends) in which one or two students receive feedback.
* Students who received feedback share what they have changed in a reflective.

Authentic audiences engage with students throughout the project rather than just at the beginning and/or end.

* In this strategy, students engage with people outside the classroom at the beginning, middle, and end of a project to hear stories that relate to the problem context, receive guidance on the technical aspects of the content they are learning, and ask questions. This requires designing projects that address problems in the real world. To do so, we use design thinking, a methodology that uses cognitive strategies to identify and produce creative solutions.

First we engage in design thinking:

* Empathy: Who is this for, and what are their needs?
* Define: What is the problem? What is at stake?
* Ideate: What are we capable of developing?

Then, we build: Prototype: Mock-ups, samples, and ideas become tangible. The focus is interaction.

Test: Take it out of the safe space. Get other hands and ideas involved, and attempt to identify additional needs.

Begin by helping students understand what STEAM-focused PBL is and how they can be used to persuade people in their community to help with a particular cause by doing something specific, such as the following:

* Calling out bullying
* Recycling more
* Conserving water
* Attending a park clean-up
* Wearing seat belts
* Sharing content on social media
* Attending a presentation to learn what can be done
* Welcoming refugee students
* Voting in local elections

**ENSURE THAT STUDENTS CREATE AUTHENTIC PRODUCTS**

While many forms of education ask students to consume information and then share it back with the teacher, STEAM-focused PBL empowers students to design, create, and produce—which develops their knowledge and skills along the way. A typical STEAM-focused PBL may culminate in a presentation as a final product; however, a traditional presentation may not be the most authentic product choice. Teachers can think more expansively about alternative products that are more authentic to the role and the problem that students are exploring.

**SAMPLE LESSON PLAN**

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| **Date:**  **Teaching staff:**  **Term:**  **Week:**  **Year Level:**  **Time/length:**  **Key Learning Area:**  **Topic/focus:** |

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| **Lesson Name:** |
| **Sample Student Outcomes:**  Provide a list of the anticipated outcomes of the lesson; what students will know, understand, and do. Example: Students will know…, Students will understand…, Students will do… |
| **Lesson Description:**  Provide a short, 2-3 sentence description of the lesson. |
| **Pre-requisites to this lesson plan (if applicable):** |
| **Length:**  Is this one, 40-minute lesson? Several varied-minute lessons within a unit adding up to two-hours? |
| **Illinois State Arts Standard:**  Select the appropriate standard for this lesson.  Know the….  Through creating and performing, understand how works of art are produced.  Understand the role of the arts in civilizations, past and present. |
| **Common Core State Standards:**  Select the appropriate Common Core State Standard(s) that is directly related to this lesson. |
| **Enduring Understandings:**  An understanding refers to transferable, big ideas having enduring value beyond a specific topic; it is universal generalization.” What we want students to understand and be able to use several year from now, after they have forgotten the details. Is it transferable? Can you teach it over and over again? Does it connect to other things? |
| **Essential Questions:**  Essential questions are not answerable with finality in a brief sentence; their aim is to stimulate thought, to provoke inquiry, and to spark more questions. Essential questions do not yield a single straightforward answer.” Essential questions come from the Enduring Understanding that has been turned into a question. Usually begins with: how, what, or why. |
| **Case section:**  Provide a short case for brainstorming |
| **Cognitive Skills:**  Decision Making  Problem solving  Creative Thinking  Interpersonal Skills |
| **Content:**  The content of the unit is based on the disciplinary or topic-area concepts.  Building Knowledge through Texts |
| **Assessments:**  Describe the diagnostic, formative, and summative assessments employed in this lesson to gauge student learning. |
| **Evidence of Student Learning:**  Provide a list of the process documentation that you plan to acquire during the course of the lesson. These may include photographs of students engaged in learning, drafts of student work, quotes from students, interviews of students, video, etc. |
| **Texts/Resources:**  The collection of short and extended works aligned to the standards and content. Examples: texts, works of art, word wall, etc. |
| **Learning Activities:**  A series of tasks the student will engage in over the course of the unit. The activities are based on what students need to understand and be able to do for the performance assessment and are aligned to your standards and essential questions.  Include key learning activities like art-making, questioning, reflection, and contextual information/research.  Encourage description, analysis, and interpretation.  Be prepared to highlight instructional strategies. (Below is a sketch of the moments that may exist within an arts lesson.  Teacher may elaborate or describe the lesson using these prompts provided.)  Re-state lesson description  Warm-up  Diagnostic  Assessment  Learning Activity  Set-up Demonstration/Modeling (I do-we do-you do)  Studio/Rehearsal/Workshop (students engage in creating/planning/refining)  Clean-up  Presentation of Work |
| **Suggested Extensions:**  Provide a bulleted list of potential next steps or subsequent learning activities that will extend the teaching and learning of arts content. Students could explore advanced topics in the area, research other artists and practitioners in the field, or develop either individual or group extensions, depending on the initial project. |