



STEAM BO.SS

boosting soft skills

Challenge Template

Title



Sapere utile



UNIMORE
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MODENA E REGGIO EMILIA



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1. Project-Based Learning (PBL) Foundations

- **Driving Question:** Start with a core question that drives the project, making it relatable to real-world applications and challenges.
- **Assessment and Audience:** Define how student outcomes will be measured and identify an authentic audience for presenting results (e.g., peers, local experts)

2. Engineering Design Process (EDP) in STEAM

1. **Define the Problem:** Ask “What is the problem?”
2. **Explore and Identify:** Identify the challenge, including constraints like materials, budget, or time.
3. **Imagine and Brainstorm:** Generate multiple solutions without judgment to promote innovative ideas.
4. **Create and Prototype:** Develop prototypes, gather materials, and plan steps.
5. **Test and Evaluate:** Assess the prototype, noting areas of success and needed improvements.
6. **Iterate:** Refine the design based on feedback and repeat testing as necessary.
7. **Communicate Results:** Present findings, explaining how the solution addresses the original problem

3. Discourse, Reflection, and Questioning

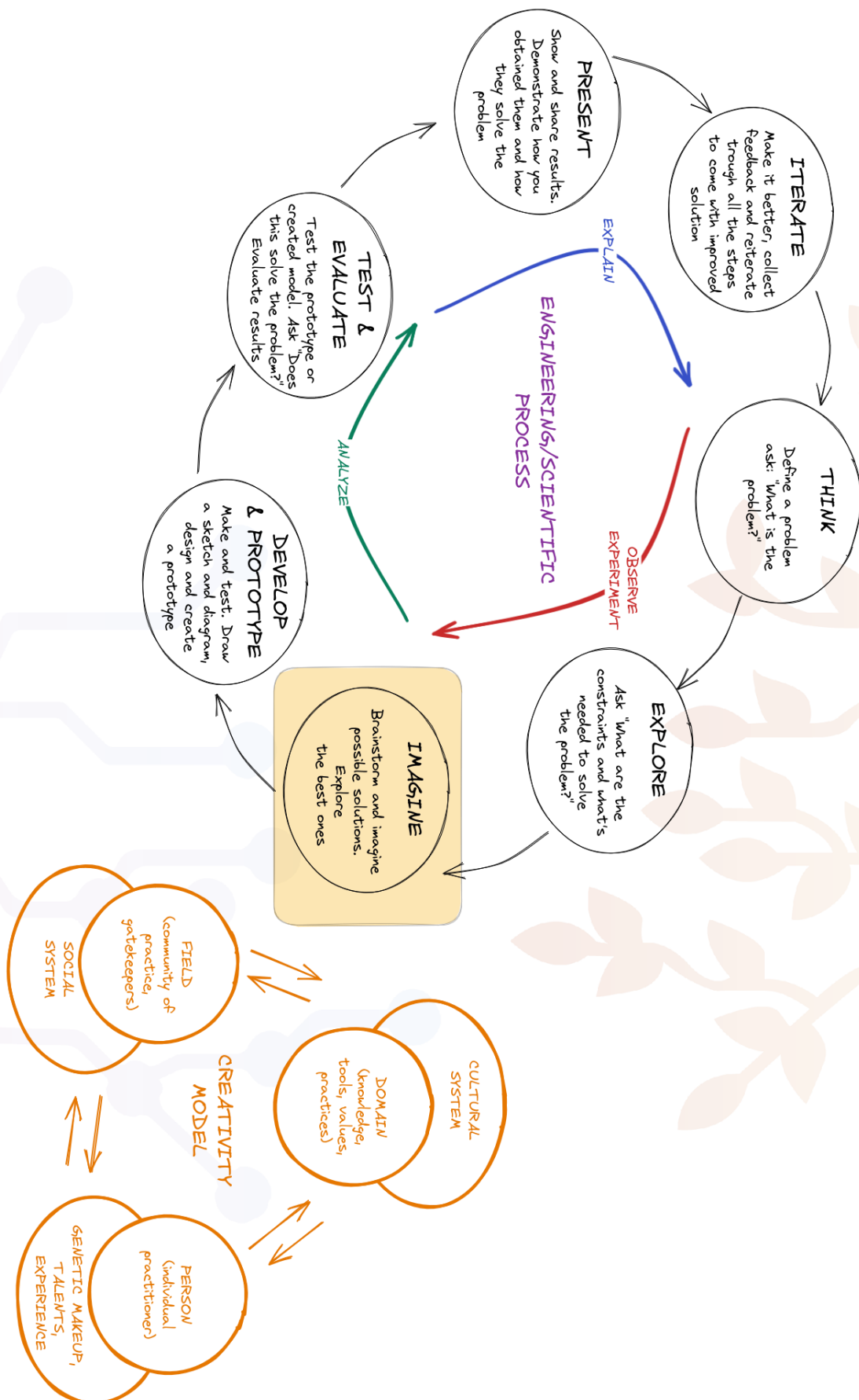
- **Facilitating Scientific Discourse:** Engage students in discussions that require evidence-based reasoning and critical analysis. Encourage collaborative conversations focused on understanding rather than winning arguments.
- **Purposeful Questioning:** Use open-ended questions to promote deeper thinking. Examples include, “What would happen if...?”, “How could you improve...?”, and “What is the connection between...?” These questions stimulate exploration and self-discovery
- **Reflection Tools:** Implement structured reflection activities, such as daily project logs, group sharing, and individual journaling. Students can reflect on successes, challenges, and improvements

4. Daily Activity Templates

- **Progress and Planning Logs:** Use daily logs to track achievements, outline next steps, and reflect on group dynamics. Include sections for students to agree or disagree with ideas, note new insights, and set specific objectives for the following day.
- **Self-Assessment:** Students can rate their work quality and contribution to the group, fostering personal responsibility and team improvement

5. 21st Century Skills Integration

- STEAM activities should build critical skills like collaboration, problem-solving, creativity, and emotional intelligence. Evaluate which skills each project emphasizes and incorporate tasks that enhance these skills (e.g., teamwork, conflict resolution, creative brainstorming)



Question for evaluation	✓	✗
Does the project engage students in hands-on, active learning? Are there clear, specific learning objectives? Does the project connect to real-world challenges? Is there a compelling, open-ended driving question that guides the project and encourages inquiry? Does the project integrate multiple disciplines to foster interdisciplinary learning? Is the project student-centered, allowing students to explore and take ownership of their learning with the teacher as a facilitator? Are project activities designed to be inclusive and accessible to all learners, including those with special needs? Does the project incorporate design and problem-solving processes that encourage students to think critically and iteratively? Do students work in cooperative, collaborative groups to solve problems and achieve project goals? Are there structured opportunities for students to give and receive feedback, reflect on their progress, and improve their ideas? Do students create meaningful, real-world products or prototypes as part of their learning process? Do students have the chance to present their work to an audience beyond the classroom, receiving real-world feedback? Does the project provide students with opportunities for hands-on creation, even if a formal maker space is unavailable? Does the project promote the development of 21st-century skills, such as critical thinking, creativity, collaboration, and emotional intelligence, conflict management, flexibility, problem-solving, time management? Is there flexibility within the project to adapt to students' needs and interests while still aligning with learning goals? Are students encouraged to use digital tools and technology to support research, collaboration, and product creation? Are students encouraged to document their learning journey, including their challenges, successes, and improvements?		

Use the checklist to evaluate pre- and post-program creation to verify whether or not the proposed program adheres to the goals of a STEAM program.

General information:

Title <i>(specify Title of the initiative)</i>	
Brief Description <i>(describe the activity some important points: - foresee techniques like PBL and flipped classroom (see MOOC platform) - use real-world problems as a starting point (-- Here may be a list of points that must be present in an outreach activity description --)</i>	
Driving Question	
Keywords	
Topic <i>(main topic that will be discussed during the outreach)</i>	
Age Range <i>(refer to K-12 classification - link -)</i>	
Number of participants	

Participant characteristics <i>(previous knowledge/level of skills, interests, demography - i.e., male/female ratio -)</i>		
Didactical Hours <i>(define the global duration of the camp and subdivision in each day)</i>		
Training Program Outline <i>(detailed outline of the entire training program, including timeline name of the specific activity, then detail it in the specific card)</i>	Introduction	
	Activity 1	
	Activity n	
	Conclusion	
	Total time	
Detailed Schedule <i>(write, structure, or draw a detailed activity plan for the whole duration of the program)</i>		

Learning objectives (-- here better to give a definition and some examples to help --) <i>Suggestions:</i> - foresee constant assessment of them, collect appropriate feedback, and change activity accordingly on the go - assessments can be formative, summative, individual, or group (for outreach activity, summative group assessment is preferred)				
Material budget (try to foresee eventual costs for teachers, venue, and accessory elements like food or gadgets. Also, refer to the field below to detail the total materials cost.)				
List of materials (with hypothetical cost per student and alternatives)				
Components name	Quantity	Link to purchase	Alternative links	Cost
	Number of components needed for the expected participants			

Venue needs (in terms of classroom size, tools, and so on)	
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General suggestions section:

- **Think holistically:** Ensure your projects and activities are well-rounded, incorporating various aspects of STEAM and addressing multiple skills simultaneously.
- **Be creative:** Use innovative and engaging methods to capture the interest of young adults and make learning enjoyable.
- **Encourage Reflection:** Build in opportunities for participants to reflect on their learning and development, helping them internalize the skills they acquire

For each activity:

Setting the scene

(Brief description of the context and the activity. Understand the problem)

Activity Challenge

(Description of the objective of the activity. What problem do I need to solve?)

Desired results

Goals	
What students will understand/know/be able to do at the end of the activity	

Teaching methods (i.e., inverse classroom, PBL approach . . .)	
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Assessment

Specific assessment task	
Other evidence of assessment	

Extensions and content connections (are any other implementations possible? with different levels of difficulties and/or different target backgrounds)

Level 1	
Level 2	
Level 3	

Expected difficulties

Resources (all resources needed for the project, materials, software, etc.)

Preparation

Preparation of things to do and materials to be used and how	What supplies will I use?	What is my plan?

STEM connections... the science behind the activity

S	
T	
E	
M	

STEAM approach: detail specific design choices to implement the STEAM approach



Soft-Skill integration

Teamwork & Collaboration	
Conflict Management	
Flexibility	
Problem-Solving	
Time Management	

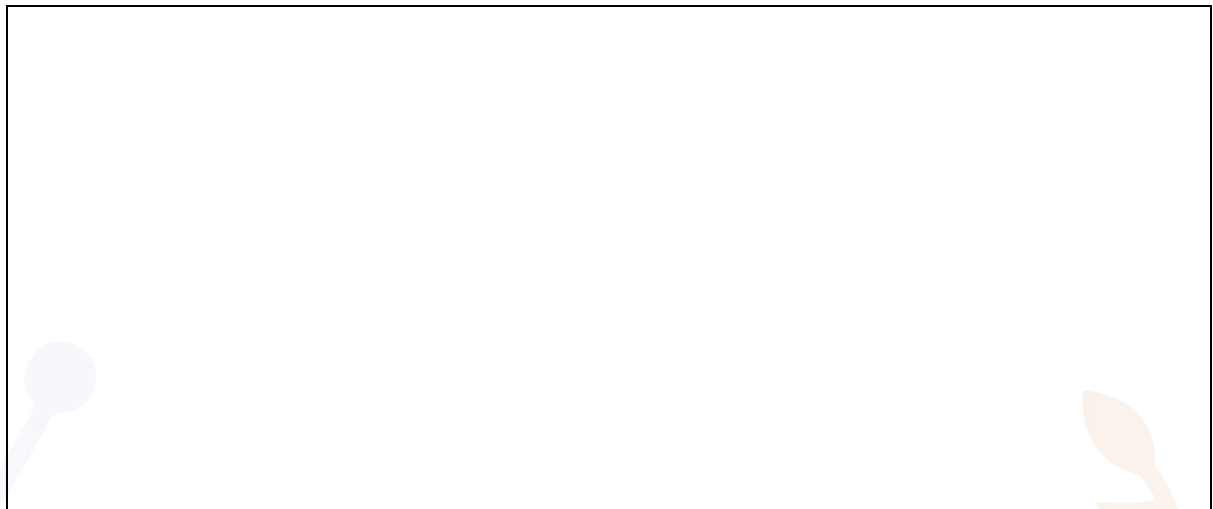
Related questions...

Observations

What worked for me?	What did not work for me?

Modifications: possible extensions of the activity

New ideas I had while working



Daily Project Planner and Log

To facilitate hands-on learning within the STEAM approach, a dedicated section for a daily project log, planning, and reflection is proposed. This addition aims to encourage structured, reflective practice, enhancing engagement with each step of the learning process.

Driving question(s) of today's activity <i>(specify which question or questions have been asked today)</i> <i>Be creative; if there have been multiple questions, highlight the characteristics held by each one (difficult or not / shared or disputed / kept or discarded / question from previous iteration or new question)</i>	
New ideas <i>(which ideas came up today?)</i>	

Self-reflection: <i>(peer feedback, what went well and what went wrong, something unexpected from today)</i>	
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	PROGRESS	PLANS	NEXT ITERATION
Problem definition			
List of possible solutions			
Development and Prototypes			
Test and Evaluation			
Presentation			