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STEAME TEACHER ACADEMY

Guidelines for facilitating the learning of STEAME
Reference Number: 101102619

Module and Workshop Learning Plan

Module Number and Area/Topic: STEAME LEARNING WITH ENTREPRENEURIAL MINDSET

Module Number: 8

Area: 2 - MOTIVATION AND FACILITATION OF THE LEARNING PROCESS

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1. Introduction and broad description of the context and goal of the area/topic addressed with reference to the STEAME Teacher Facilitators Competence Framework for student and serving teachers

This module aims to motivate both students teachers and service teachers to use an entrepreneurial mindset approach when applying the STEAME learning approach through: a) developing entrepreneurship attitudes and skills through learning and teaching across the whole curriculum; b) promoting the entrepreneurship capacity of each pupil and ensuring they experience and develop an understanding of the world of work in all its diversity; c) building the 'can do' mindset through 'hands-on' entrepreneurship experience within the teaching and learning dynamics.
The training module will be highly interactive and practical, structured as an entrepreneurial simulation where at least 4 STEAM participants will collaborate across various stages of an entrepreneurial project. Additionally, it will offer tangible examples, ideas, and tools to inspire and assist educators in planning their own entrepreneurship mindset based project.

2. Learning objectives and learning outcomes with reference to the defined list of learning outcomes in the Competence framework

Learning objectives
The module will help the participants to:

1. Understand the entrepreneurship mindset approach, as well as the key principles and benefits of entrepreneurial based projects
2. Discover the structure and the main key-components and characteristics of an entrepreneurial project
3. Gain confidence with the incorporation of entrepreneurship mindset in curriculum topics from any discipline of STEAME approach.

For students teachers (Level 1):
LO#7 - Propose meaningful and authentic contexts that do not have a single solution to be addressed through STEAME PBL with a particular group or groups of students
LO#9 - Identify teaching and learning strategies that engage students in interdisciplinary practices (act like scientists / artists / engineers / entrepreneurs...) as part of STEAME PBL

LO#11 - Understand the need to share or agree on a set of students' assessment criteria of STEAME PBL learning activities beforehand
LO#12 - Define a productive use of up-to-date technologies to facilitate student learning in STEAME PBL learning activities, including artificial intelligence, virtual and hybrid learning environments
LO#14 - Plan STEAME PBL teaching and learning activities that balance students' individual and group work.

For service teachers (Level 2):
LO#7 - Propose meaningful and authentic contexts that do not have a single solution to be addressed through STEAME PBL with a particular group or groups of students
LO#9 - Identify teaching and learning strategies that engage students in interdisciplinary practices (act like scientists / artists / engineers / entrepreneurs...) as part of STEAME PBL
LO#11 - Understand the need to share or agree on a set of students' assessment criteria of STEAME PBL learning activities beforehand
LO#12 - Define a productive use of up-to-date technologies to facilitate student learning in STEAME PBL learning activities, including artificial intelligence, virtual and hybrid learning environments
LO#14 - Plan STEAME PBL teaching and learning activities that balance students' individual and group work.

3. Competences that are developed

This training module promotes the acquisition of knowledge, the training of skills and the acquisition of attitudes specific to the following competences in the competences framework for student teachers and in-service teachers using the STEAME approach in the educational process:

Competence 1. Design and implement context-bound STEAME projects
Competence 3. Monitoring STEAME projects and reporting
Competence 4: Embed learning in truly interdisciplinary STEAME projects
Competence 5: Guide student learning in STEAME projects
Competence 6: Support STEAME projects with the right learning environment and resources
Competence 11: Apply creativity and innovation in STEAME projects
Competence 12: Keep learning about STEAME projects and share knowledge

In this respect, the following knowledge is expected:
- The pedagogical components of project-based learning: compelling questions, real-world contexts, inquiry and research, project planning, technology integration, communication and engagement.
- Formative and summative assessment methods suitable for evaluating STEAME projects.
- Understanding how STEAME areas intersect and relate to one another, allowing for the creation of holistic and integrated projects, especially "A" for Arts and "E" for Entrepreneurship.
- Knowledge of qualitative and quantitative research methods to help students design and conduct research-like activities within the project context.
- Familiarity with technology tools and software relevant to STEAME fields.
- Ability to transfer knowledge to new and unforeseen situations, located in the context of implementation.
- Awareness of relevant professional organisations and associations as well as conferences, workshops, and seminars related to STEAME education.

According to the competence list assigned to this module, the following skills should be addressed:
- Organization of project components, setting goals, and creating a timeline for project completion
- Identifying potential risks to the completion of STEAME projects and developing strategies to mitigate them
- Ability to leverage technology to support students' research, collaboration, data analysis, and project presentation
- Basic project management skills to help students plan, organise, and execute collaborative projects effectively, meeting deadlines and achieving project goals.

- Proficiency in digital tools and platforms that facilitate online collaboration, enabling students to work together seamlessly, even in virtual environments.
- Explore programs, applications, and devices to develop STEAME application environments.
- Promote the sharing and open access of knowledge, publishing materials or resources in open access spaces.

By going through this training module, an attitude set will be cultivated that includes:
- Be open to participating in organisations, associations, or exchange spaces.
- Commitment to staying updated with the latest trends, research, and best practices in STEAME education.
- Celebrating the achievements and successes of collaborative efforts, recognizing and appreciating the contributions of students, peers, and stakeholders.
- Embracing a growth mindset and promoting the idea that challenges are opportunities for learning and improvement, encouraging students to persevere through difficulties
- Genuine interest in exploring new ideas and technologies, leading to innovative project designs.
- Acceptance of the importance of bringing STEAME projects to an end even if they do not go as planned.
- Valuing collaboration among students, colleagues, stakeholders and families.

4. Content and Resources (providing information on the various constituents/ dimensions of the topic under consideration), including presenter's notes for guidelines of the workshop organisation

Current and future students and graduates need to be agile problem identifiers as well as problem solvers. They have to identify and creatively solve societal problems through user-focused value creation. The term Entrepreneurship Mindset (EM) was defined, by Alain Fayolle (Handbook of research in entrepreneurship education, Vol 1, pag 149, 2007), as a specific state of mind which orientates human conduct toward entrepreneurial activities and outcomes. Fayolle further states that individuals with Entrepreneurial Mindsets are often drawn to opportunities, innovations and new value creation.In this way, the Entrepreneurial Mindset (EM) can improve one's economics, individual, and global societal value. EM development can be scaffolded and supported in a variety of ways depending on program context.

The main interest is in applying and integrating EM into the course context by identifying entrepreneurship through three lenses. First, the macro perspective considers the "big picture" with the goal to discover, evaluate, and exploit opportunities. Second, the micro perspective focuses on the smaller day-to-day problem-solving tasks where entrepreneurs following the design thinking process (or another engineering design process) in an effort to empathise with users, define the problem and identify design criteria, ideate and brainstorm potential solutions, and finally prototype and test those solutions with users. Third, the most valuable design perspective highlights the need to validate hypotheses related to customer desirability, technical feasibility, and business viability.

Content:
1. Introduction to Entrepreneurship: Evolution, Types and Qualities of Entrepreneurs, Entrepreneurial Cultures.
2. What is an entrepreneurial mindset?
3. A project based view of Entrepreneurship: Idea generation; Funding and legal issues; Marketing; The business plan.
4. Entrepreneurship in STEAME curriculum
5. Project Ideas and evaluations.

Resources:
1. Handbook of research in entrepreneurship education, Vol 1, pag 149, 2007.
2. ***, https://www.eduporium.com/blog/eduporium-weekly-fostering-a-stem-mindset-in-students/
3. Monica Lindgren, Johann Packendorff, A Project-based View of Entrepreneurship: Towards Action-orientation, Seriality and Collectivity, http://www.lindgren-packendorff.com/Lindgren_Packendorff_2003_Mov.pdf, 2003.

4. Jantje Halberstadt, Antonieta Alcorta de Bronstein, Jean Greyling, Shaun Bissett, Transforming Entrepreneurship Education Interdisciplinary Insights on Innovative Methods and Formats, Springer, 2023.
4. Colombelli, Alessandra; Loccisano, Shiva; Panelli, Andrea; Pennisi, Orazio Antonino Maria; Serraino, Francesco, Entrepreneurship education: The effects of challenge-based learning on the entrepreneurial mindset of university students, MDPI, 2022.
5. Birdthistle, Naomi, Riverola, Carla, Boorer, Lenka, Ekberg, Sara, Senyard, Julienne, Getting you out of the black hole – empowering STEAM teachers to teach the 21st century skills, http://hdl.handle.net/10072/414773, 2022.
6. Briana Sell Stenard, Interdisciplinary Skills for STEAM Entrepreneurship Education, https://doi.org/10.1177/25151274211029204, 2021.
7. Lynch, M.; Andersson, G.; Johansen, F.R. Merging Systems Thinking with Entrepreneurship: Shifting Students' Mindsets towards Crafting a More Sustainable Future. Sustainability 2021, 13, 4946. https://doi.org/10.3390/su13094946
8. ***, https://s3platform.jrc.ec.europa.eu/documents/20125/254002/no.1_entrepreneurial_mindsets_en.pdf/bde60c68-1bbe-8da1-204f-4675a816c61a?t=1621268542363

Presenter's notes for workshop organisation
The main guidelines for organising the workshop include:
- Clearly define the objectives of each thematic session.
- Incorporate group activities to promote networking and knowledge sharing.
- Encouraging interactive discussions and collaborative work.
- Allocating time for participants to explore, discuss and self-evaluate.
- Providing practical demonstrations of proposed ideas.
- Providing appropriate resources and references to support further investigation.

5. Methodology and approaches for the module training presentation and guidelines for workshop organisation

Methodology:
A step-by-step approach based on assessment of current knowledge and skills, introduction of new concepts and practices, independent and collaborative activities, and applying support strategies.
Approaches:
Active, interactive and collaborative learning, brainstorming, investigation, group work, practical activities, presentation of results for sharing.
Guidelines for workshop organisation:
- Establish the role of participants: Moderator, Rapporteur, The rest of participants.
- Establish issues for discussion and criteria of assessment.
- Encourage participants to share experience and ideas.
- Allocate time for reflection on the process.
- Do the planned tasks.
- Evaluate the reaction of participants.
- Report on results.

6. Instruments/Tools/Supporting Materials/Resources to be used

Videos, Urls, paper, markers, ppt presentation, and worksheets.

PART 1	Introductory Activities (creation of interest, reference to real-world issues, relation to background and experiences, etc.)
Learning Objectives	Highlight the participants' needs and previous experience about Entrepreneurship Mindset (EM)
Learning Outcomes	Teachers reflect on their on their instruction and previous experience about EM and identify and determine their related needs
Competences	Reflection skills
Content, Resources and Tools	Paper, markers, tape, post-it notes
Activities	1. Participants will type on paper their name, a short resume on their interest in education and EM. They share this data to group members and discuss common knowledge and interests. 2. Participants will type on post-it-notes their needs related to introducing EM in education, and what they expect from this workshop.
Estimated Time	20 minutes

(add more Activity sections as needed)

PART 2	Development Activities
Learning Objectives	1. Understand what EM really is, as well as the key principles and benefits of STEAME learning with EM 2. Discover the main components and characteristics of EM
Learning Outcomes	1. Recognize the differences among Entrepreneurial activity and STEAME learning with EM 2. Develop a concept MAP about STEAME learning with EM
Competences	Design and implement context-bound STEAME projects Monitoring STEAME projects and reporting Embed learning in truly interdisciplinary STEAME projects Guide student learning in STEAME projects Support STEAME projects with the right learning environment and resources Apply creativity and innovation in STEAME projects Keep learning about STEAME projects and share knowledge
Content, Resources and Tools	Content: What is an entrepreneurial mindset? A project based view of Entrepreneurship: Idea generation; Funding and legal issues; Marketing; The business plan. Resources: note, ppt presentation, url, video Tools: Paper, markers, tape, post-it notes 1. The Power of an Entrepreneurial Mindset, https://www.youtube.com/watch?v=Ihs4VFZWwn4

	2. How to Cultivate an Entrepreneurial Mindset, https://www.youtube.com/watch?v=niOV_jSVCKs 3. Programming your mind for success, https://www.youtube.com/watch?v=MmfikLimeQ8 4. Birdthistle, Naomi, Riverola, Carla, Boorer, Lenka, Ekberg, Sara, Senyard, Julienne, Getting you out of the black hole – empowering STEAM teachers to teach the 21st century skills, http://hdl.handle.net/10072/414773, 2022. 5. Briana Sell Stenard, Interdisciplinary Skills for STEAM Entrepreneurship Education, https://doi.org/10.1177/25151274211029204, 2021. 6. Lynch, M.; Andersson, G.; Johansen, F.R. Merging Systems Thinking with Entrepreneurship: Shifting Students' Mindsets towards Crafting a More Sustainable Future. Sustainability 2021, 13, 4946. https://doi.org/10.3390/su13094946 7. ***, https://s3platform.jrc.ec.europa.eu/documents/20125/254002/no.1_entrepreneurial_mindsets_en.pdf/bde60c68-1bbe-8da1-204f-4675a816c61a?t=1621268542363
Activities	**1. Participants will brainstorm on STEAME learning with EM and note the key aspects of EM in order to develop PBL with EM.** **2. Participants will access resources in order to have a deep understanding on STEAME learning with EM, identify on INTERNET some Entrepreneurial projects based on interdisciplinary topics.** **3. Participants will update the noted key aspects found on activity 1, in order to create a Concept Map on STEAME learning with EM.**
Estimated Time	**3o minutes**

(add more Activity sections as needed)

PART 3	**Practical Activities (hands-on activity) in the case of a workshop mode**
Learning Objectives	**1. Understand the entrepreneurship mindset approach, as well as the key principles and benefits of entrepreneurial based projects** **2. Discover the structure and the main key-components and characteristics of an entrepreneurial project** **3. Gain confidence with the incorporation of entrepreneurship mindset in curriculum topics from any discipline of STEAME approach.**
Learning Outcomes	**1. Propose meaningful and authentic contexts that do not have a single solution to be addressed through STEAME PBL with a particular group or groups of students** **2. Identify teaching and learning strategies that engage students in interdisciplinary practices (act like scientists / artists / engineers / entrepreneurs...) as part of STEAME PBL** **3. Understand the need to share or agree on a set of students' assessment criteria of STEAME PBL learning activities beforehand**

	4. Define a productive use of up-to-date technologies to facilitate student learning in STEAME PBL learning activities, including artificial intelligence, virtual and hybrid learning environments **5. Plan STEAME PBL teaching and learning activities that balance students' individual and group work.**
Competences	**Design and implement context-bound STEAME projects.** **Monitoring STEAME projects and reporting.** **Embed learning in truly interdisciplinary STEAME projects** **Guide student learning in STEAME projects** **Support STEAME projects with the right learning environment and resources** **Apply creativity and innovation in STEAME projects** **Keep learning about STEAME projects and share knowledge**
Content, Resources and Tools	**Content:** **What is an entrepreneurial mindset?** **Entrepreneurship in STEAME curriculum.** **Resources: note, ppt presentation, url, video** **Tools: Paper, markers, tape, post-it notes** 1. The Power of an Entrepreneurial Mindset, https://www.youtube.com/watch?v=Ihs4VFZWwn4 2. How to Cultivate an Entrepreneurial Mindset, https://www.youtube.com/watch?v=niOV_jSVCKs 3. Programming your mind for success, https://www.youtube.com/watch?v=MmfikLimeQ8 4. Birdthistle, Naomi, Riverola, Carla, Boorer, Lenka, Ekberg, Sara, Senyard, Julienne, Getting you out of the black hole – empowering STEAM teachers to teach the 21st century skills, http://hdl.handle.net/10072/414773, 2022. 5. Briana Sell Stenard, Interdisciplinary Skills for STEAM Entrepreneurship Education, https://doi.org/10.1177/25151274211029204, 2021. 6. Lynch, M.; Andersson, G.; Johansen, F.R. Merging Systems Thinking with Entrepreneurship: Shifting Students' Mindsets towards Crafting a More Sustainable Future. Sustainability 2021, 13, 4946. https://doi.org/10.3390/su13094946 7. ***, https://s3platform.jrc.ec.europa.eu/documents/20125/254002/no.1_entrepreneurial_mindsets_en.pdf/bde60c68-1bbe-8da1-204f-4675a816c61a?t=1621268542363
Activities	**1. Participants will develop matrices of integration of Entrepreneurship in interdisciplinary projects establishing at least two disciplines from STEAM.** **2. Participants will share the idea of entrepreneurial projects based on their matrix.** **3. Participants will select an idea and develop an educational project with EM to implement the idea.**

	4. Participants will evaluate the obtained result to see if can be included as case study in STEAME curriculum. **5. Participants will share their results.**
Estimated Time	**30 minutes**

(add more Activity sections as needed)

PART 4	**Evaluation of Learning Outcomes**
Learning Objectives	**1. Point out the connections among disciplines of study in a STEAME with EM PBL unit** **2. Appraisal activities incorporated in a STEAME with EM PBL unit based on specific criteria**
Learning Outcomes	**1. Propose meaningful and authentic contexts that do not have a single solution to be addressed through STEAME PBL with a particular group or groups of students** **2. Identify teaching and learning strategies that engage students in interdisciplinary practices (act like scientists / artists / engineers / entrepreneurs...) as part of STEAME PBL** **3. Understand the need to share or agree on a set of students' assessment criteria of STEAME PBL learning activities beforehand** **4. Define a productive use of up-to-date technologies to facilitate student learning in STEAME PBL learning activities, including artificial intelligence, virtual and hybrid learning environments** **5. Plan STEAME PBL teaching and learning activities that balance students' individual and group work.**
Competences	**Design and implement context-bound STEAME projects.** **Monitoring STEAME projects and reporting.** **Embed learning in truly interdisciplinary STEAME projects** **Guide student learning in STEAME projects** **Support STEAME projects with the right learning environment and resources** **Apply creativity and innovation in STEAME projects** **Keep learning about STEAME projects and share knowledge**
Content, Resources and Tools	**Use Learning and Creativity Plans making use of Entrepreneurship, evaluation rubric**
Activities	**Participants are given a Learning and Creativity Plan of an implemented STEAME with EM unit and evaluate the extent to which the various components (learning goals/objectives, activities, driving question, etc.) meet specific criteria of the evaluation rubric**
Estimated Time	**10 minutes**

(add more Activity sections as needed)

7. Reflection and Closure activity

1. The Group reflection on key takeaways, discuss the most insightful experience on STEAME learning with EM.
2. The Rapporteur reflection on strong/weak aspects of the group activity.
3. The Moderator reflection on current personal experience and on applying STEAME learning with EM in teaching practices.
4. Closing the session and sharing post-workshop resources.