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STEAME GOES HYBRID: Blueprint Guidelines and Policy Recommendations

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Training program for selected STEAME subject teachers or others interested in the implementation of STEAME – HYBRID L&C Plans in the context of the STEAME GOES HYBRID project

Module Number and Area/ Topic: Module 4

How teachers can work together in a STEAME hybrid environment

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Introduction and Broad Description of the Context and Goal of the area/ topic addressed:

By definition STEAME education concerns a learning approach involving a variety of realms of meaning i.e. Science, Technology, Engineering, Arts, Mathematics and Entrepreneurship. The whole approach stems out from the need to connect education with the real world and not consider it as an isolated luxury that has been devised for just to be an added burden to human beings.

This need, that is to interconnect a broad variety of realms of meaning and action, demands that a broad range of human capital should be involved. This idea is in the spirit of the contemporary practice that construction and creation demands a broad range of contributors with diverse cognitive background and competencies.

In the context of traditional education we had teachers that were experts in a field of study and one of their major roles was to elaborate and provide activities for developing skills and competencies in that particular field. But now, with the immense amount of knowledge and the multidimensional requirements of competencies for the complex world we live, the situation is different. Thus, an answer to respond to this challenge, is to develop teams of collaborating teachers representing or equipped with a variety of background and competencies.

Furthermore recent developments pressed in the direction of adopting approaches of teaching and learning in a hybrid environment, that is in an environment that has to take into consideration learning in a physical contact (face to face) of the partners in the learning process

as well as an online contact, taking into consideration the digital means and the advantages that the Internet can offer.

The present module aims exactly at identifying methods, culture and disposition for such collaboration. Furthermore the module aims at identifying the pros and cons of such approaches of collaboration of the facilitators of learning and develop competencies for improving the positive aspects and remedying or even nullifying the negative or risky aspects.

Learning Outcomes: With the completion of this module the trainees will:

1. Be able to identify the major facilitators that have to be taken into consideration in determining and designing STEAME activities for students at secondary school level. In this quest they should consider approaches that the activities can take place in a face to face context or in an online environment, aiming at optimum results, through the consideration of the pros cons and the availability of means.
2. Be able to specify their (the major facilitators) role and responsibilities.
3. Be able to concentrate on the role and responsibilities of the sub-team of teachers that will be involved in the process of designing and implementing the STEAME activities in a hybrid environment
4. Be able to refer, to illustrate and to apply in class or online competencies for collaboration in order to promote actions and arrangements for preparing, formulating and implementing action plans for learning.

Such competencies include:

- Contact, cooperation and reflection with the workers shaping the real world.
 - Provision of incentive and motivation to the learners.
 - Determining and formulating, in cooperation with other facilitators, problems of interest to the real world
 - Support and guide, in cooperation with other facilitators, the students for gathering information
 - Support and guide, in cooperation with other facilitators, the students for handling a problem or project
 - Support and guide, in cooperation with other facilitators, the students for using a variety of topics (in the context of STEAME) in developing and representing models for the promotion of solutions and results to the issues under consideration
 - Support and guide, in cooperation with other facilitators, the students in developing creative and innovative approaches or models for the promotion of solutions and results to the issues under consideration.
5. Be able to discuss and exchange ideas with other learning facilitators on:
 - Constructing learning plans with mutual content, complementing the aspects, concepts and processes that have common interest or value
 - Assessing the various activities so that they have mutual value and
 - Exploiting audiovisual and digital aids
 - Developing and comparing face to face versus online approaches for the learning of various topics

Content and Resources (providing information on the various constituents/ dimensions of the topic under consideration):

The STEAME Hybrid Project : <https://steame-hybrid.eu>

In particular **O1. Blueprint Guidelines for Hybrid STEAME activities** (online and distance blended project-based learning)

The STEAME Project: <https://steame.eu/>

In Particular its Outputs

O1. Guidelines for dynamic and adaptive STEAME curricula

O2. Guidelines for STEAME Activities in Schools for two age groups

O3. Guidelines for STEAME School Organizational Structure

The STEAME Observatory: <https://steame.eu/steame-observatory/>

Learn STEM : <http://www.learn-STEM.org>

Integrated STEM teaching State of Play: (<http://steamit.eun.org>).

[Why Team Collaboration Is Important in Hybrid Work Environments - zipBoard](#)

OECD Teacher collaboration in challenging learning environments [Teacher collaboration in challenging learning environments - OECD Education and Skills Today \(oecdeditoday.com\)](#)

[The Golden Ratio/ Section and its Relation to Human Activities](#)

Methodology and approaches for the module training presentation:

- Collaborative learning: brainstorming, debates, co-design and planning
- Constructionism: inquiry based and project-based learning
- Developing case studies and worksheets
- Investigating-researching using the web
- Maieutic: Socratic method of questioning

Instruments/ Tools/ Supporting Material/ Resources to be used:

(list of file, web links, videos, PPT.... use file names inserting the Module number)

- The STEAME goes Hybrid project open access environment.
- Posters, videos, photos, ppt presentations

Pedagogical/Learning Sequencing and Activities Plan:

Introductory activities (creation of interest, reference to real value issues, relation to background experiences etc)

Activity 1: Brainstorming on the consideration of the issue of “How teachers can work together” in the context of promoting and implementing STEAME hybrid schools organizational structure	
Development	Brainstorming by considering the need of more than one person in order to achieve better outcomes. Reference to the consideration of the following basic terms: STEAME environment Hybrid environment Teachers facilitating learning

	<p>Reference to Aristotle: ‘the whole is greater than the sum of its parts’.</p> <p>A discussion is enacted of what can be achieved by considering two or more situations or personalities or other concepts that can produce/ create another entity with a number of added value properties</p> <p>Discuss possible combinations of teachers and others that are involved in the development of an appropriate STEAME activity, as well as the roles and responsibilities of each of them, working in a traditional or a digital context.</p>
Materials	The poster on the chaos theory from the STEAME observatory https://steame.eu/wp-content/uploads/2020/12/Have-you-heard-about-CHAOS-Theory-infographic-poster.pdf
Resources	On the web descriptors: donkey, Horse, mule e.g. https://www.luckythreeranch.com/lucky-three-ranch-training/mule-facts/
Estimated Time	15 min
Environment/Room Setting	In the case of a class: Circular arrangement in order to facilitate discussion In the case of online or digital presentation: Provisions for chatting
Trainees’ role	Participation in the discussions.

Development activities

Activity2: Discussion of various combinations of teams working together, taking into consideration the needs that give rise to the STEAME approach. In this context refer to teams that have to work for problem solving project work, construction activity, Game Activity, Cultural activity and so on	
Development	<p>Consideration of the traditional approaches for co-teaching. Refer to what happens in traditional teaching and particularly in Schools of Students with Special needs:</p> <p>Reflection on the extent of the restrictive model arising from these in the context of STEAME.</p> <p>Reflection-Discussion on the following issues How teachers can work together? What is the range of this question?</p> <ul style="list-style-type: none"> • Teachers working with other teachers? • Teachers working with other entities in the context of the school?(students, heads, parents...) • Teachers working with experts in various fields? (Universities, Industry, NGOs,) • Teachers working with organisations that are promoting/ introducing to the world of life and work? (Galleries, Museums ...)

	<p>What skills/ competencies do we expect from teachers in order to promote the idea of “working together in a hybrid environment”?</p> <p>How do we develop/ encourage/ cultivate such skills/ competencies?</p> <p>PROVIDE A quiz for the participants</p> <p>Examples: Discussions on some ideas of collaborating teams in developing approaches for STEAME. Such teams can be supported by persons/ experts that are not necessarily teachers.</p> <p>Consideration of examples MATHeatre, MATHFactor The Monopoly game Tunnel of Eupalinos. The Ancient Samos and its water supply https://youtu.be/AJTwxCaOODM Refer to the Monopoly connecting Industry, mathematics and Business Refer to various kinds of STEAME activities. Extend the game to cover other issues as well, for example environmental issues and the need to introduce other dimensions in the game.</p> <p>This discussion supports the need to promote the following activities that are providing material for the achievement of the objectives of this module</p>
Materials	QUIZ 1 in Appendix 1
Resources	MATHeatre, MATHFactor see the webpage of EUROMATH EUROSCIENCE to find a number of examples https://www.youtube.com/watch?v=0BtpDpa55u4&list=PLpPvt2LgHCYfTulPIQkch1y7VW0l4ncje&index=8&t=301s The MATH – GAMES webpage:
Estimated Time	25 min
Environment/Room Setting	In the case of a class: Circular arrangement in order to facilitate discussion In the case of online presentation: Provisions for chatting
Trainees’ role	Discussion Answering the Quiz 1 in Appendix 1

Activity3: Concentrating on the cases of collaboration between teachers, identify and refer to the objectives and steps involved for actions of having them working together.

Development	From the previous discussions it becomes clear that collaboration between teachers is quite a necessity, particularly in the case of STEAME. So the question:
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	<p>How do teachers can work together?</p> <p>LIST 1 What skills and competencies should be developed in promoting this idea?</p> <p>LIST 2 What are the practical aspects that they should observe in order to achieve this goal?</p> <p>Discussion and suggestion of a series of actions that are helpful in moving in the direction of collaboration in the context of STEAME</p>
Materials	LIST 1 and LIST 2 in APPENDIX 2
Resources	
Estimated Time	30 min
Environment/Room Setting	In the case of a class: Circular arrangement in order to facilitate discussion In the case of online presentation: Provisions for chatting
Trainees' role	Participation in the discussion Study LIST 1 and LIST 2

Activity4: Discussion of examples using the L&C Plans in the web page of the project	
Development	<p>What are the constituents/ structure of a Learning and Creativity Plan as it is presented in the webpage of the project? Consider the topic "The Golden Ratio and its role in Human Activities", or any other example, and identify, study, discuss and reflect on this, taking into consideration the points presented in the previous parts of this presentation i.e the elements of Stage I and Stage II. Furthermore reflect on the extent/ degree that each trainee feels that he/ she is in a position to develop their own Learning and Creativity Plans</p>
Materials	
Resources	The STEAME goes hybrid webpage
Estimated Time	30 min
Environment/Room Setting	In the case of a class: Circular arrangement in order to facilitate discussion In the case of online presentation: Provisions for chatting
Trainees' role	Study of a case of an L&C plan Participation in the discussion

Activity 5 Identify some tips that have to be taken into consideration or are helpful for effective and fruitful collaboration of teachers	
Development	<p>Quiz Write on a piece of papers your suggestions for Tips for supporting/ facilitating/ enabling the collaboration/ working together of teachers in the context of STEAME.</p> <p>Provide a list of such tips and discuss/ exchange of ideas on them.</p> <p>Worksheet 1 Identify elements that facilitate collaboration in the development of the L&C Plan for the topic “The Golden Ratio and its role in Human Activities”</p> <p>Presentations - Discussion</p>
Materials	Quiz 2 and Worksheet 1 in APPENDIX 3
Resources	The STEAME goes hybrid webpage Consider the examples of L&C Plans in Output 1
Estimated Time	25 min
Environment/Room Setting	
Trainees’ role	Answering quiz 2 Working on worksheet 1 Participation in the discussion

Practicing Activities (hands-on activity)

Activity6: Develop case studies on a few topics by referring to the possible teams of teachers, their Knowledge background and decide/ describe their role and responsibilities in the development of a Learning and Creativity Plan	
Development	<p>Consider the participating list of trainees in this course taking into consideration there field area.</p> <p>Decide on a two or three topics that you feel that are suitable for developing activities in the context of STEAME with the collaboration of other teachers.</p> <p>Select from the participants’ list (preferably) or from the teachers in your school, one or two that you feel that you feel that they have common ground for working together on one of the topics you are thinking of.</p> <p>Exchange ideas with them on the feasibility of collaboration on developing activities in the context of STEAME, proposing topics and initial steps for work.</p>

	Continue this exchange of ideas and proposals until you reach to a point that you feel that you have enough ground of agreement and common understanding covering a topic, connection with the appropriate curricula etc, taking into consideration the list of tips suggested earlier. After reaching a consensus on the basic points start working for the preparation of a learning plan
Materials	Writing means
Resources	LIST 2 (APPENDIX 2)
Estimated Time	30 min
Environment/Room Setting	In the case of a class: Circular arrangement in order to facilitate discussion In the case of online presentation: Provisions for chatting
Trainees' role	Participation in the discussion Groupings of participants in order to develop collaborating ideas for the STAGES I and II presented in the LIST 2 (APPENDIX 2)

Reflection and Closure activities:

Evaluation of Learning Outcomes

Activity 7: Discussion and reflection of the role of the teachers in the process of working together. Consideration of self-evaluation processes of the teachers in this process. Consideration of issues of evaluating the extent of the impact on students' learning through the approach of teachers working together	
Development	Quiz 3 What are the guiding principles for a successful preparation of a project or similar action requiring the involvement of more than one facilitator in the learning process in the context of STEAME? What are the important steps and actions that a team of teachers should undertake in order to design and process a learning plan in the context of STEAME? Reflection and Discussion
Materials	Writing means
Resources	Quiz 3 in APPENDIX 4
Estimate Time	20 min
Environment/Room Setting	In the case of a class: Circular arrangement in order to facilitate discussion In the case of online presentation: Provisions for chatting
Trainees' role	Answering quiz 3 Participation in the discussion and reflection

APPENDIX 1

Discussion of various combinations of teams working together

Before we move to the main question (of How can teachers work together?)

let us reflect and consider some examples where we have issues that are interesting to both the real life and the school curriculum and where we are expecting collaboration of a broad range of expertise.

The issues can range from technological needs to games and cultural activities.

QUIZ 1

Write down some of your suggestions

In this process it is useful to identify:

Topic of interest.

Its relation to STEAME goes hybrid.

Composition of Teams of collaboration and expected contribution from each member of the team.

Associated Areas of the school curriculum.

APPENDIX 2

LIST 1

Framework of capabilities of the teachers in the process of working together.

They should:

1. Be able to identify the major facilitators that have to be taken into consideration in determining and designing STEAME goes hybrid activities for students at secondary school level.
2. Be able to specify their (the major facilitators) role and responsibilities.
3. Be able to concentrate on the role and responsibilities of the sub-team of teachers that will be involved in the process of designing and implementing the STEAME hybrid activities.
4. Be able to refer, to illustrate and to apply in class competencies for collaboration in order to promote actions and arrangements for preparing, formulating and implementing action plans for learning.

Such competencies include:

- Contact, cooperation and reflection with the workers shaping the real world.
 - Provision of incentive and motivation to the learners.
 - Determining and formulating, in cooperation with other facilitators, problems of interest to the real world
 - Support and guide, in cooperation with other facilitators, the students for gathering information
 - Support and guide, in cooperation with other facilitators, the students for handling a problem or project
 - Support and guide, in cooperation with other facilitators, the students for using a variety of topics (in the context of STEAME goes hybrid) in developing and representing models for the promotion of solutions and results to the issues under consideration
 - Support and guide, in cooperation with other facilitators, the students in developing creative and innovative approaches or models for the promotion of solutions and results to the issues under consideration.
 - Assess cooperatively the work of the students and provide comments and suggestions taking into consideration the contribution of the various STEAME constituents.
 - Review and reflect cooperatively (learners and learning facilitators).
5. Be able to discuss and exchange ideas with other learning facilitators on:
 - Constructing learning plans with mutual content, complementing the aspects, concepts and processes that have common interest or value
 - Assessing the various activities so that they have mutual value and
 - Exploiting audiovisual and digital aids

LIST 2

Stages and points that are facilitating the process of collaboration of teachers

STAGE I: Preparation by one or more teachers plus experts/ entrepreneurs

1. Formulating initial thoughts on the thematic sectors/areas to be covered
2. Engaging the world of the wider environment / work / business / parents / society / environment/ ethics

3. Target Age Group of Students - Associating with the Official Curriculum - Setting Goals and Objectives
4. Organization of the tasks of the parties involved - Designation of Coordinator - Workplaces etc.

Some Actions that may be taken for stage I by the persons involved:

	Wider Environment/- Society plus the school staff	School Administration	Teacher 1	Teacher 2	... Teacher n
Step 1 of STAGE I	Identify an issue, idea ...	Specify the aspects of the issue as they relate to the learning process, discuss possible thematic areas	Propose ideas in related to his/hers subject area	Propose ideas in related to his/hers subject area	Propose ideas in related to his/hers subject area
Step 2 of STAGE I	Contact/ collaboration between the various actors to specify the various aspects, constituents of the problem ...	Contact/ collaboration between the various actors to specify the various aspects, constituents of the problem ... Connect this to elements of the official curriculum	Participate and elaborate on the discussions. Investigate on their repercussions on the curriculum of the topic in relation to the real world	Participate and elaborate on the discussions. Investigate on their repercussions on the curriculum of the topic in relation to the real world	Participate and elaborate on the discussions. Investigate on their repercussions on the curriculum of the topic in relation to the real world
Step 3 of STAGE I		As specified in Step 2. Determine general objectives. Discuss responsibilities. Prepare initial plan	Determine particular objectives and specify initial actions and needs. Exchange ideas with the other teachers	Determine particular objectives and specify initial actions and needs. Exchange ideas with the other teachers	Determine particular objectives and specify initial actions and needs. Exchange ideas with the other teachers
Step 4 of STAGE I	Collaborate with the school and the teachers, in particular, on further actions ranging from support	Collaborate on management and organization issues	Determine organizational and management issues and initial plan, through collaboration	Determine organizational and management issues and initial plan, through collaboration	Determine organizational and management issues and initial plan, through collaboration

	(economic ...) to scientific ...		with the other teachers	with the other teachers	with the other teachers
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STAGE IIa: Action Plan Formulation (Steps 1-18)

Preparation (by the teachers involved)

1. Relation to the Real World – Reflection
2. Incentive – Motivation
3. Formulation of a problem (possibly in stages or phases) resulting from the above

Development (by students) – Guidance & Evaluation (in 9-11, by teachers)

4. Background Creation - Search / Gather Information
5. Simplify the issue - Configure the problem with a limited number of requirements
6. Case Making - Designing - identifying materials for building / development / creation
7. Construction - Workflow - Implementation of projects
8. Observation-Experimentation - Initial Conclusions
9. Documentation - Searching Thematic Areas (STEAME fields) related to the subject under study – Explanation based on Existing Theories and / or Empirical Results
10. Gathering of results / information based on points 7, 8, 9
11. First group presentation by students

Configuration & Results (by students) – Guidance & Evaluation (by teachers)

12. Configure mathematics or other STEAME models to describe / represent / illustrate the results
13. Studying the results in 9 and drawing conclusions, using 12
14. Applications in Everyday Life - Suggestions for Developing 9 (Entrepreneurship - SIL)

Review (by teachers)

15. Review the problem and review it under more demanding conditions

Project Completion (by students) – Guidance & Evaluation (by teachers)

16. Repeat steps 5 through 11 with additional or new requirements as formulated in 15
17. Investigation - Case Studies - Expansion - New Theories - Testing New Conclusions
18. Presentation of Conclusions - Communication Tactics.

STAGE IIb: STEAME Actions and Cooperation in developing Creative Projects or other activities for school students

Brief Description/Outline of Organizational Arrangements / Responsibilities for Action

Phase	Activities/Steps Teacher 1(T1)	Activities /Steps Teacher 2 (T2)	Activities /Steps Teacher n (Tn)	Activities /Steps By Students Age Group: _____
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	Cooperation with T2, Tn, and student guidance	Cooperation with T1, Tn and student guidance	Cooperation with T1, T2 and student guidance	
A	Preparation of steps 1,2,3	Cooperation in step 3	Cooperation in step 3	
B	Guidance in step 9	Support guidance in step 9	Support guidance in step 9	4,5,6,7,8,9,10
C	Creative Evaluation	Creative Evaluation	Creative Evaluation	11
D	Guidance	Guidance	Guidance	12
E	Guidance	Guidance	Guidance	13 (9+12)
F	Organization (SIL) STEAME in life	Organization (SIL) STEAME in life	Organization (SIL) STEAME in life	14 Meeting with Business representatives
G	Preparation of step 15	Cooperation in step 15	Cooperation in step 15	
H	Guidance	Support Guidance	Support Guidance	16 (repetition 5-11)
I	Guidance	Support Guidance	Support Guidance	17
K	Creative Evaluation	Creative Evaluation	Creative Evaluation	18

So the question: What should be the some aspects that collaborating teachers should have as lighthouse in the process of guidance?

STAGE IIc: Remarks and Guiding Lines for Collaborative Guidance

Some Important Points that should be taken into consideration by the teachers collaborating in the process of guiding the students to take productive actions in the development of the project

- **The official Curriculum.** The activities and support should be focused in promoting the goals of the official curriculum as a whole and also as it is reflected in the individual curricula of the topics where the collaborating teachers are experts.
- **Key Knowledge, Understanding and Success Skills.** The project is focused on student learning goals, including standards-based content and skills such as critical thinking/problem solving, collaboration and self-management.
- **Challenging Problem or Question.** The project is framed by a meaningful problem to solve or a question to answer, at the appropriate level of challenge.
- **Sustained Inquiry.** Students engage in a rigorous, extended process of asking questions, finding resources and applying information.
- **Authenticity.** The project features real-world context, tasks and tools, quality standards or impact. Or it speaks to students' personal concerns, interests and issues in their lives.
- **Student Voice & Choice.** Students make some decisions about the project, including how they work and what they create.
- **Reflection.** Students and teachers reflect on learning, the effectiveness of their inquiry and project activities, the quality of student work, obstacles and how to overcome them.
- **Critique, Revision and Assessment.** Students give, receive and use feedback to improve their process and products.

- **Public Product.** Students make their project work public by explaining, displaying and/or presenting it to people beyond the classroom.

APPENDIX 3

Quiz 2

Write on a piece of papers your suggestions for

Tips for supporting/ facilitating/ enabling the collaboration/ working together of teachers in the context of STEAME goes hybrid.

Provide a list of such tips and discuss/ exchange of ideas on them.

Worksheet 1

Identify elements that facilitate collaboration in the development of the L&C Plan for the topic “The Golden Ratio and its role in Human Activities”

APPENDIX 4

Quiz 3

What are the guiding principles for a successful preparation of a project or similar action requiring the involvement of more than one facilitator in the learning process in the context of STEAME?

What are the important steps and actions that a team of teachers should undertake in order to design and process a learning plan in the context of STEAME?