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STEAME ACADEMY
TEACHING FACILITATION LEARNING & CREATIVITY PLAN (L&C PLAN) - LEVEL 1
STUDENT TEACHERS: Escape Room in the Classroom

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1. Overview

Title	Escape Room in the Classroom
Driving Question or Topic	*Composition of one or small number of essential questions (or related topics)* Exploring the relationship between Mathematics and Physics in the 11th grade
Ages, Grades, …	15-16 11th
Duration, Timeline, Activities	2,5 *Timeline/frame, calendar* 3
Curriculum Alignment	Sciences, technology and mathematics
Contributors, Partners	
Abstract - Synopsis	This activity can be implemented in any discipline or to any interdisciplinary frame and it can be used to review topics. In this case, the activity is used to explore the relationship between mathematics and physics in the 11th year, usually taught independently without allowing students to realize their association. Mathematics provides the fundamental tools for understanding and solving problems in physics. Concepts such as calculus, algebra, and trigonometry are essential for describing and analyzing physical phenomena. In physics, these mathematical principles are often used to model and predict the behavior of various systems, making the two subjects closely intertwined. Student teachers should review both math and physics curricula
References, Acknowledgements	

2. STEAME ACADEMY Framework*

Teachers' Cooperation	*Teacher 1 cooperation with Teacher 2 in case of learning elements involving two different disciplines and specific cooperation of mentoring by service teachers for student teachers* *Work plan and steps with clear goals and activities between service and student teachers* Math teachers and physics teachers can cooperate to create ideal exercises that better reflect the relationship between mathematics and physics.
STEAME in Life (SiL) Organization	*Meeting with business representatives/Applications in real world Entrepreneurship – STEAME in Life (SiL) Days* Math teachers and physics teachers should cooperate to align their classes.

Action Plan Formulation	*Reference to the Stages and the Steps of the STEAME ACADEMY Framework for Project-based STEAME learning (Action Plan Formulation)*

[*] *under development the final elements of the framework*

3. Objectives and Methodologies

Learning Goals and Objectives

Identification of goals or objectives using appropriate verbs, related or corresponding to competences (knowledge – skills - attitudes), what learner will be able to do after the project

Knowledge

- Position and movement
- Displacement and distance
- Velocity and acceleration
- Newton Laws
- Electric field
- Magnetic field
- Electromagnetic field

Skills

- Solve equations and inequations
- Complete analysis of functions, polynomial functions and trigonometric functions
- Interpretation of physic problems
- Interpretation of real-world problems

Attitudes

- Understand the role of mathematics in the study of physics
- Collaborative work between teachers from different disciplines

Learning Outcomes and expected Results

Definition of Learning Outcomes using action verbs

1. Review knowledge of some mathematic topics.
2. Review knowledge of some physics topics.
3. Explore the relationship between some mathematic topics and physics.

Prior Knowledge and Prerequisites

Prior experiences, knowledge and skills required by learners to bring with them to this learning experience

- Solve equations and inequations
- Do the complete study of functions

Motivation, Methodology, Strategies, Scaffolds

Teaching and learning strategies, approaches, methods, and/or techniques for achieving learning objectives (a project-based activity may help the competence development, or gamification, or other methods, etc.)
Instruction differentiation for students' needs (learning styles, multi-modal representations, roles to students etc.)
Active students' engagement, individual-team-classroom work, scaffolding techniques, etc.

This teaching methodology is collaborative and involves a combination of activities to review the mathematical concepts in a physics perspective. This activity consists of:

1. pre-test in the moodle: the students answer several true/false questions regarding the topics
2. filling in a group sheet on paper: the students identify the group and its elements
3. 5 challenges plus 1: the students follow the instructions and complete every challenge,

4. evaluating the groups: the performance and knowledge of the students are evaluated by the teacher,
5. the winners receive a winner's certificate and a symbolic prize: the key to get out of the classroom
6. post-test in the moodle: the students answer to similar true/false questions as in the pre-test
7. evaluation the activity on google forms: the students answer a satisfaction questionnaire about the activity.

For each challenge, the teacher provides a sheet with instructions. Each group finishes the 5 challenges at their own speed until the 5+1 challenge in which they have to wait for all the groups to finish the previous challenge.

Challenge 1:

A box (named Challenge 1) with n (n=number of groups) bags with 5 cards each. Each group takes out a bag and answers the questions. The answers are written on the challenge sheet and return it to the teacher. Alternatively, the APP MILAGE can be used.

The teacher has to draw up the questions and answers, relating maths and physics.

Challenge 2: Correspondence

2 Boxes:

One box (named Challenge 2A) with plastic envelopes numbered from 1 to n (n=number of groups) with several individual cards with questions.

Another box (named Challenge 2B) with plastic envelopes numbered 1 to n (n=number of groups) with more individual cards with the answers than the cards with the questions.

The students have to match the questions with the correct answers and return it to the teacher.

Alternatively, the APP MILAGE can be used.

The teacher has to draw up the questions and answers, linking maths with physics.

Challenge 3:

The student draws a paper with a crossword puzzle from a box (named Challenge 3)

Teacher: Create a crossword puzzle relating Maths to Physics

Alternatively, the APP MILAGE can be used.

Challenge 4:

	The student draws a paper with a practical case relating maths and physics from a box (named Challenge 4). Solve it in the paper and explain the resolution and return the paper to the teacher. Alternatively, the APP MILAGE can be used. Challenge 5: The student draws a paper from a box (named Challenge 5) with instructions to create a problem, solve it and give a classification to the necessary steps of resolution in the paper. Return the paper to the teacher. Teacher: Create a page with the instructions and space where the student can write. Alternatively, the APP MILAGE can be used. Challenge 5+1: The student draws a paper with a general question regarding the relationship between math and physics. They have to wait for everyone to finish the previous challenge. Teacher: Create a page with the instructions and space where the student can write. Alternatively, the APP MILAGE can be used after. Student evaluation: The teacher will assess the groups by the time taken to answer and the answer itself. Time: Minimum 1 to maximum n (n=number of groups). Quotation for each answer. In the last challenge (5+1), only the first group that answers gets points. Final=Time+Quotation

4. Preparation and Means

Preparation, Space Setting, *Troubleshooting Tips*	*Procedures, spaces, and material preparation* *Setting in classroom, outdoor activity, computer lab, hybrid environment, etc.* Prepare the class to group work. All the questions can be answered using paper and the mobil phone.
Resources, Tools, Material, Attachments, Equipment	*Instructional sources and digital material with the related references needed for the implementation of the learning plan*
Health and Safety	There are no particular safety measures required by this L&C Plan.

5. Implementation

Instructional Activities, Procedures, Reflections	*Brief and comprehensive description of the creative activities, tasks, or learning experiences (individual-team-classroom work)* *Engagement and active participation through hands-on practices* *Students' feedback and reflection on their thinking, process, or learning.* *Monitoring students' learning and progress evaluation* **Part 1 – Preparation** The service teachers in collaboration with the physics teachers select the questions that most reflect the relationship between math and physics. **Part 2** The service teachers create all the papers necessary for the challenges or digitalizes them and inserts them in the MILAGE APP. **Part 3** The service teacher applies the activity in the classroom. **Part 4** The service teacher share the results with the students and promotes the reflection and discussion.
Assessment - Evaluation	*Assessment and formative evaluation processes and rubrics to measure the student's ability to perform what was described in the objectives* Student teachers must build a Geogebra file, with the properties explored
Presentation - Reporting - Sharing	*Documents, outputs, artifacts, products produced by the students with references, web links etc., for sharing to media* Student teachers must build a Geogebra file, with the properties explored
Extensions - Other Information	

Resources for the development of the STEAME ACADEMY Learning and Creativity Plan Template
In the case of learning through project-based activity

STEAME ACADEMY Prototype/Guide for Learning & Creativity Approach
Action Plan Formulation

Major steps in the STEAME learning approach:

STAGE I: Preparation by one or more teachers

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.

STAGE II: Action Plan Formulation (Steps 1-18)

Preparation (by teachers)

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 (AI 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 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 Days)

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 III: STEAME ACADEMY Actions and Cooperation in Creative Projects for school students

Title of Project: _____
Brief Description/Outline of Organizational Arrangements / Responsibilities for Action

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