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STEAME ACADEMY
TEACHING FACILITATION LEARNING & CREATIVITY PLAN (L&C PLAN) - LEVEL 2
SERVICE TEACHERS: JUNIOR PROJECT FOR SUSTAINABILITY

1. Overview

Title	Junior project for Sustainability
Driving Question or Topic	*Research on the topics related to sustainability ll number of essential questions (or related topics)*
Ages, Grades, …	*14-16* *9-10 grades in Secondary School/Gymnasium*
Duration, Timeline, Activities	*36* *One class per week within a school year*
Curriculum Alignment	Science, Information technologies, innovative subjects: *Human and the living environment, Personal and interpersonal development.* *Topics covered in the curriculum:* *Mathematics – units, geometry, percentages, charts, probabilities* *Science subjects* Biology, Chemistry, Physics: global warming, climate change, temperature, types of materials, chemical characteristics, living organisms, matter-energy-information. *IT/Computer science* – MS Office with focus on Excel for data analysis and charts, PowerPoint, Canva and other tools for presentations and storytelling *Technology/Engineering*: prototyping including 3D printing, industrial design, etc. *Arts* – design of flyers, brochures, presentations, prototypes, logos *Entrepreneurship* – marketing materials, concepts about business model, cost and revenue, basic terminology explained in a nutshell.
Contributors, Partners	*Companies and solutions for sustainable development in the broad context with focus on the Sustainable development goals.*
Abstract - Synopsis	*Application of WBL: project for research conducted by students on the topics related to sustainable development, with definition of a project and a concept for solution as final output. Activities include case studies, research methods by desk research, surveys, interviews. Outputs include prototypes, videos, business plans. Adaptation based on teacher's experience and subject.*
References, Acknowledgements	https://www.sustainabilityscience.org/, https://sdgs.un.org/goals

2. STEAME ACADEMY Framework*

Teachers' Cooperation	*Develop a workplan for collaboration within your school according o the curriculum and the structure:*

	• T1 is the teacher of subjects covering the topics of sustainability: Biology, Chemistry, Physics, etc. who will present the main concepts, definitions, and other relevant information. This is the main teacher who coordinates the process and assign roles and task to students and their teams. • T2 is the teacher in Philosophy/Personal development to support the teamwork process, guide for interviews, analytical skills, presentation, communication and leadership skills. In these classes the teams are formed and normed with respective exercises, presentations are made on different topics to practice and train students. • T3 is teacher in IT who will present research methods, data bases, digital skills: use of tools for survey design and creation, presentations, video making, and other activities. T3 cooperates with T2 coordinated by T1 with the Gantt chart and respective deadlines and milestones in the process. • T4 is the teacher in Math who cooperates closely with T3. • T5 is the teacher in Economics/Entrepreneurship/Marketing who sets the foundations of the business concepts and theory with relevant templates and tools for marketing purposes and common business creation concepts. *If there are special (innovative subjects) those teachers should be actively involved* .
STEAME in Life (SiL) Organization	*Based on your experience and network with companies and entrepreneurs, the following activities should be planned and organized in the beginning of the school year*: focus on best practices and companies which are strong with track record in sustainable practices. Meeting with professionals and business representatives for interviews on sustainable development, circular economy, fighting climate change, and other. Entrepreneurship – STEAME in Life with context of sustainability: creation of a final product as a solution to identified problem with logo, slogan, marketing campaign elements, materials, forecast for business development with a business model.
Action Plan Formulation	**STAGE I**: Preparation by one or more teachers [STEPS 1-4]: 1. Relation to the Real World with examples and best practices 2. Incentive – Motivation for business creation, hands-on experience like prototyping and product creation and promotion 3. Setting the problem and the team formation based on the above steps and collaboration between teachers with the leading one being T2 Development (by students) – Guidance & Evaluation (in 9-11, by teachers) 4. Research / Gather Information on the sustainability goals and problems 5. Research on existing solutions and best practices 6. Definition of one problem as a statement 7. Finding partners and establishing relationships with stakeholder form business, research, academia, labs for 3D printing and other.

	8. Collecting information from primary and secondary research. 9. Analysis of the results in a structured presentation or another deliverable with main conclusions about attitude and expectations of the target groups. 10. Prototyping and testing of a 11. Documentation and analysis of results based on points 8-10 – validation of the provided solution and feedback by potential and hypothetical users. 12. Team presentations by student teams. Configuration & Results (by students) – Guidance & Evaluation (by teachers) 13. Configure STEAME models to describe / represent / illustrate the results 14. Studying the results and drawing conclusions about Review (by teachers) 15. Review the problem and the proposed solution with supporting data analysis and prove of results Project Completion (by students) – Guidance & Evaluation (by teachers) 16. Repeat steps 8 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 and the final evaluation, including 360° assessment methodology. The support, feedback and evaluation by the teachers is accompanying throughout the implementation of the activities and not only the final result. The process requires one major meeting in the beginning of the project and regular meetings to align the tasks and topics covered within the curriculum. Final meeting is arranged to set the schedule for presentations, evaluation and other activities. Also, in the process teachers should be aligned in approaching third parties like businesses, las for 3D printing, research institutes if they are available and the school management should be involved, too from administrative and collaborative pint of view at the highest level.

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

3. Objectives and Methodologies

Learning Goals and Objectives	Upon completion, students will know: - The basics of sustainability science as an applied science - The Sustainable development goals - Definitions about circular economy - Ecological, human, and economic health and vitality. - Social, economic, environmental contexts.

	- The fundamental triad of energy/matter/information *Skills:* - Primary and secondary research - Presentation delivery and development - Digital tools for production of videos - Digital tools for presentations - Digital tools for survey generation - MS Office - Google products - Prototyping - Collaboration with external stakeholders
Learning Outcomes and expected Results	Based on your subject and area of expertise define the main outcomes integrated into the curriculum. The focus is on: Students will have better awareness about sustainability and the impact on our daily lives, ideas for change of behaviour, issues related to climate change, new knowledge, good practices in circular economy, real-world experience. The outcomes and results are broken down to subjects: *Science*: understand and apply the basic concepts and principles relate to environmental protection, recycling, reuse, reduce, Sustainable development goals, the matter-energy-information triad. The ultimate outcome: the relationship between he separate subjects in school Biology, Chemistry, Physics, including the reasoning and rationale of the theoretical content. *Computer science*: pupils will be able to use functions of Excel for data analysis including chart creation and choosing the respective type; proficient use of presentation-making tools including video making, inserting different elements, prototyping, storytelling, design of brochures, flyers and other digital materials *Arts:* use of colors, shapes, design, formatting, artistic techniques for video creation and storytelling with setting scenes and topics. *Mathematics*: probabilities, data collection and analysis including calculus, charts, percentage use and other. *Entrepreneurship*: work in teams, coordination of tasks, generation of real results, setting up a business concept and model with revenue and costs forecast, concepts about sales, (digital) marketing, business roles and structure at a basic level.
Prior Knowledge and Prerequisites	Basic STEAME+ Education skills at a lower level, from the elementary school (primary education).
Motivation, Methodology, Strategies, Scaffolds	General: project-based learning within a school year for competence development. - Gamification in class and exercises for teamwork - Instruction differentiation for students' needs (based on their learning styles, multi-modal representations, assigning roles to students etc.) - Collaboration with third parties: e.g., to take interview, conduct surveys, Active students' engagement, combination of individual and team-classroom work, scaffolding techniques, extracurricular work and activities like field trips to labs, companies, other organisations for research, prototyping, including 3D printing, etc.

4. Preparation and Means

Preparation, Space Setting, *Troubleshooting Tips*	Preparation is led by T1 who has experience and expertise for in-class preparation which is related to instructions, theoretical, exercises, etc. Plan also the following activities and tasks which bring the innovative features:

Resources, Tools, Material, Attachments, Equipment	Outdoor activities require planning, arrangement, schedule according to the school classes, timing, access to partners, the labs, the teachers, materials. Shared space is the best option for sharing resources and creation of knowledge base: Google classroom, Google drive, customized solutions, etc. Instructional sources and digital materials and tools for communication, presentations, learning plans and syllabus for alignment within the individual setting: topics and schedules. Computer resources: tablets by school or students, laptops, MS Office, Google products, etc. Laboratories for scientific experiments (lab activities in the regular curriculum). Artistic space where arts is taught, materials for such activities.
Health and Safety	*Lab activity instructions and regulations.*

5. Implementation

Instructional Activities, Procedures, Reflections	Organize practical, workshop-type of classes and activities to generate ideas and hands-on experience brining teachers' experience, case studies and examples. After-class tasks and homework in teams and individual assignments led by the T2 and T1. Engagement and active participation through hands-on practices with support by additional teachers if necessary, only for individual sessions and mentoring – e.g. multimedia, digital expertise, etc. Students' feedback and reflection on their thinking, process, or learning by journals, self-reflection, individual and teamwork sessions led by T1 and T2. Monitoring students' learning and progress evaluation in the regular classes of the respective subjects by assessments based on which a common rubric is applied.
Assessment - Evaluation	a combination of skills and knowledge acquisition: - Content Knowledge: Ensure students grasp the core concepts explored in the project. - 21st Century Skills: Assess critical thinking, problem-solving, collaboration, communication, and creativity throughout the project. - Project Management Skills: Evaluate how students plan, organize, manage time, and adapt during the project. - Learning Process: Reflect on how students approach challenges, learn from mistakes, and demonstrate self-directed learning. - Self-evaluation and reflection: what went well, what didn't work, what to be improved. How I performed? - Peer evaluation within the team and by the team leader. Formative Evaluation Strategies for PBL: - Checklists & Progress Reports: Provide ongoing feedback with checklists outlining key milestones and rubrics for specific tasks. Students complete progress reports reflecting on their contributions and challenges. - Peer Reviews & Group Discussions: Facilitate peer reviews where students analyze each other's work based on rubrics. - Organize group discussions to share ideas, troubleshoot, and refine approaches.
Presentation - Reporting - Sharing	- Storytelling techniques to present their observations and experience; prototypes of outputs, artifacts, products produced in a rough version including a website simulation, digital product, 3D model, etc. - Final narrative as a presentation highlighting the main results, conclusion and analysis including the personal input and feedback.

Extensions - Other Information	

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