



Co-funded by the Erasmus+ Programme of the European Union







Νέες Καινοτομίες και Εργαλεία για τη Μάθηση στο Σχολείο STEAME του Μέλλοντος

New Innovations and Tools for the learning in the STEAME School of the Future



Dr. Gregory Makrides Coordinator of STEAME Projects, Professor of STEAME Education, Pedagogical University of Krakow, PL President, Cyprus Mathematical Society, President, THALES Foundation Chair, Education Committee, European Mathematical Society





Einstein said

"Imagination is more important than knowledge. Knowledge is limited to all we now know and understand, while imagination embraces the entire world, and all there ever will be to know and understand."

«Η φαντασία είναι πιο σημαντική από τη γνώση. Η γνώση περιορίζεται σε όλα όσα γνωρίζουμε και καταλαβαίνουμε σήμερα, ενώ η φαντασία αγκαλιάζει ολόκληρο τον κόσμο και όλα όσα θα υπάρξουν για να γνωρίσουμε και να κατανοήσουμε»









1950 With air-condition

2022 with air-condition







2020+ portability

1960 portability



EDUCATION 1.0

Authoritarian

The student is the passive recipient

Teacher-centered system - the teacher gives knowledge as the absolute leader in the classroom







EDUCATION 2.0

Communication and collaboration are starting to grow

Exam-based approach - the result is the examination - Memorization of knowledge

An underestimated student-centered approach, we call it but do not apply it.

the schools/universities are still talking about hours of teaching But they should talk about hours of learning !!!





EDUCATION 2.0



- Invasion of technology and social networking
- We apply technology to the classroom as a trend indicator, but the class continues to have the same structure.
- Complete confusion students know the technologies better than professors
- Many choices, lack of money for buying and applying,
 uncoordinated technology correlation with the syllabus the
 system can not properly follow the evolution of technology ... there
 is no teacher training in HE data is everywhere Google
 Search faster from traditional libraries ... the web could knows more
 than our professor WE WERE NOT READY FOR COVID-19





EDUCATION 3.0

Student-Centered approach

- The professor is transformed into a Coordinator/facilitator, advisor, learner and practice guide
- The student is researching more
- VR to support Flip classroom
- More dialogue, technology is everywhere, the student is self-learning and everywhere.
- The classical style classroom no longer exists
- Teaching Plans are converted into …
 - ... Learning Plans





EDUCATION 4.0

Co-creation and innovation in the centre

Whenever and Wherever

Hybrid Learning Environments

- Interactive practical exercise F2F or Distance
- Learning is done outside universities, while in university premises students develop competences and skills

Learning Plans are now called Learning & Creativity Plans
 The technology

- Its free or/and easily accessible,
- Increased use of virtual reality, artificial intelligence ,etc
- Continuous evolution and innovation and therefore a need for development of
- Competences and Skills so people become Adaptable to Change









STEAME : Science-Technology-Engineering-Arts-Mathematics-Entrepreneurship

www.steame.eu

STEAME: Guidelines for Developing and Implementing STEAME Schools

What was needed?

Model of STEAME Schools Guidelines for STEAME Activities in Schools Guidelines for cooperation between teachers of different disciplines New organizational structures for STEAME schools Training of Teachers - help them to adapt Dynamic Change in Curricula, Tools, Methods

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Outputs Developed and Published

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

www.steame.eu



Project Number: 2019-1-CY01-KA201-058240





>O1. Guidelines for dynamic and adaptive STEAME curricula





CONTENTS

- CHAPTER 1 Approaches to teaching
- CHAPTER 2 Materials for teaching
- > CHAPTER 3 Entrepreneurship aspects
- CHAPTER 4 Organizational suggestions for STEAMEoriented teaching
- CHAPTER 5 Propositions and analysis of STEAMEoriented curriculum- Adaptability and dynamics characteristics



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











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CONTENTS

- CHAPTER 1. THE STEAME FRAMEWORK OF LEARNING AND CREATIVITY PLANS
- CHAPTER 2. GUIDE TO LEARNING AND CREATIVITY PLAN DEVELOPMENT
- CHAPTER 3. STEAME LEARNING AND CREATIVITY PLANS
- CHAPTER 4. COOPERATION AND CREATIVITY PROGRAM BETWEEN SCHOOLS & INDUSTRY
- > CHAPTER 5. STEAME OBSERVATORY

Languages:

English, Polish, Italian, Bulgarian, Greek



STEAME)



What is a STEAME Learning and Creativity Plan

LEAR	RNING & CREAT	IVITY PLAN (L8	&C PLAN): A C	JSTOMIZED E-S	НОР
-	Т	Eng	A	Μ	Ent
S					

Title	A CUSTOMIZED E-SHOP					
Driving Question or Topic	What i need to know about the costs, revenue and profit in my business?					
Ages - Grades	AGES:15-16					
Duration, Timeline, Activities	4 LEARNING HOURS	2*90 MINUTES	6 ACTIVITIES			
Curriculum Alignment	Business Costs, Revenue and Profit					
Contributors, Partners	Xenia Kareli, Yannis Kotsanis					
Abstract - Synopsis	Five activities for two learning periods of 90 min (first lesson) include the analysis and the calculation of a firm's profit, the analysis of its costs and how this firm creates and increases its revenue. So, for all these reasons, in the second period of 90 min (second lesson), every group of students designs and creates a customized e-shop, that formulates a real problem. In this way, they understand the mechanism of the market in action.					
References, Acknowledgements	 Pearson Edexcel International GCSE (9-1) Economics -First published 2017, author: Rob Jones. ISBN 978-0-435-18864-1 (Student's book). Case Study (Lesson 16): Greenway Construction (activity 1). Pearson Edexcel International GCSE (9-1) Economics -First published 2018, author: Clare McCormack. ISBN:978-0-435-19134-4 (Teacher Resource Pack). 					
2. STEAME Framework*						
Teachers' Cooperation	1st Teacher: Economist					
	2nd Teacher: Technology Specialist and/or Computer Scientist (the two teachers can work together during the second lesson)					
STEAME In Life (SU) A real meeting with executives of a big firm with well-known products and call (via teleconference or face to face) and with a businessman whose matching activity is organizing and running an e-shop.						
	STAGE I: Preparation by two teachers [STEPS 1-4], and					
Action Plan Formulation	STAGE I: Preparation by ty	vo teachers [STEPS 1-4], a	ind			
Action Plan Formulation	STAGE I: Preparation by the STAGE II: Action Plan Form	vo teachers [STEPS 1-4], a nulation [Preparation STE	nd PS 1-3]			

- Empty template available for use in the Observatory in EN, GR, IT, BG, PL Completed STEAME L&C Plans in the STEAME OBSERVATORY
- Designed for minimum 2 teachers collaboration
- It includes the 18 steps prototype teacher cooperation for STEAME project activity

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

STEAME ***

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STEAME student evaluation rubric

Fully completed analytics

STEAME L&C Plans: Evaluation Rubric

1. STEAME Subjects (overall performance of respective concepts/discipline/content of K-12 level)						
	0 - N/A	1 - beg	inning	2- developing	3 - advanced	
🗆 Science 🛛 🗆 Te	chnology 🛛 🗆 En	gineer	🗆 Arts	□ Mathematics	Entrepreneurship	
2 Compotoneos //ww						
2. competences (kno	wieuge, skilis, vui	ies-attituae	57			
	basic/beginnin	g emerg	sing/developing	accomplished/strong	exemplary	
creativity, innovation						
critical thinking						
collaboration						
digital skills						
oral - written language						
presentation skills						
social & emotional						
competences						

3. Project Management, Development and Realisisation Processes						
	basic/beginning	emerging/developing	accomplished/strong	exemplary		
goal achievement and motivation						
inquiry-based process						
problem-based process						
project-based and timeline process						
resources, references						
construction, artifacts, production outputs						
Entrepreneurship						

4. Formative Assessment (specified at each L&C)

	D - limited/poor	C - adequate/good	B - substantial/great	A - detailed/excellent
Student Assessment				
by Teacher				
Self - Group*				
Self - Student*				

STEAME TRAINING COURSE FOR TEACHERS



- Modules 1-2. How to construct Learning & Creativity plans
- Module 3. How teachers can work together (18 steps prototype and other aspects)
- Module 4. How to help teachers and students work online (Hybrid environments)
- Module 5. How to support students in making oral presentations
- Module 6. How to write papers/reports
- Module 7. How to work on projects (Inquiry Based Learning, Project Based Learning)
- Module 8. How to work on projects (peer questions)
- Module 9. How to develop STEAME schools (Type A and Type B Schools, survey results)
- Module 10. Evaluating STEAME project/activities work of students (Evaluation rubrics etc)
- Module 11-12: Course Assignment hands on development of a L&C Plan





EDUCATION 4.0

Four core components are integrated to shape the concept of Education 4.0:
(i) Competencies development through IBL, PBL, CBL...internships, blended learning. Micro-credentials the competence and skill factor.
(ii) Learning Methods (Digital Learning via BYOD)
(iii) Information and Communication Technologies (VR, AI, etc)
(iv) Infrastructures, Learning Spaces, Learning Communities







Architectural Designs and Animations

Infrastructures of the future

A learning space of the future



SHE LINE

A learning space of the future







Specs Basement

BASEMENT

• STEAME THEATRE

MAIN LABS

- B1.1 Main Biology Lab
- B1.2 Main Chemistry Lab
- B2.1 Main Physics Lab
- B2.2 Main Mathematics Lab
- B3.1 Main Construction and 3D printers Lab
- B3.2 Main Environmental Lab
- B4.1 Main Robotics Lab
- B4.2 Main Computing and Software Lab
- **B5.1 Main Prototype Develpment Lab**
- B5.2 Main VR Centre Lab
- B6.1 Main Skills and Talent Development Lab
- B6.2 Main STEAME Communication Lab
- Additional VR rooms
- Learning stations
- Entry into amphitheatres



Specs Ground Floor

Satellite Labs

- G3.1 Biology-Chemistry S-Lab
- G4.1 Physics-Mathematics S-Lab
- G5.1 Industry Liaison Office
- G5.2 Virtual Business Centre
- G1.1 Robotics Computing Multimedia S-Lab
- G1.2 Sound-proof student meeting room
- G2.2 Construction- Environmental S-Lab
- G2.1 Sound-proof student meeting room
- G3.2 Sound-proof student meeting room
- G4.2 STEAME Museum for learning
- > Individual Learning Stations as private u-shape booths
- Open space movable furniture for small group work by students
- Courtyard
- Reception area
- > Entry into amphitheatres





Specs First floor

THE VERY QUIET FLOOR – THE IDEAS FLOOR

- Open space flexible movable furniture for student groups
- Co-creation Train moving ...with group siting stations
- Learning Centres/Rooms
- Additional Learning Stations
- Entry into amphitheatres
- Slow Moving STEAME train
- Administration offices



Specs Roof **Recreation spaces** Cafeteria Garden and Lake Photovoltaics **Football court** Athletic field Open Amphitheatre





MAIN LABS

B1.1 Main Biology Lab
B1.2 Main Chemistry Lab
B2.1 Main Physics Lab
B2.2 Main Mathematics Lab
B3.1 Main Construction and 3D printers Lab
B3.2 Main Environmental Lab
B4.1 Main Robotics Lab
B4.2 Main Computing and Software Lab
B5.1 Main Prototype Development Lab
B5.2 Main VR Centre Lab
B6.1 Main Skills and Talent Development Lab
B6.2 Main STEAME Communication Lab

BASEMENT 1:2000 @ A4





Satelite Labs G1.1 Robotics – Computing –Multimedia S-Lab G2.2 Construction- Environmental S-Lab G3.1 Biology-Chemistry S-Lab G4.1 Physics-Mathematics S-Lab

GROUND FLOOR 1:2000 @ A4





1st FLOOR 1:2000 @ A4





ROOF 1:2000 @ A4









MULTI-SPORTS FIELDS OF THE FUTURE

VIDEO

BASEMENT LABS




BASEMENT VR





GOUND FLOOR





GROUND FLOOR LEARNING STATIONS - HEUTAGOGY





FIRST FLOOR LEARNING ROOMS - PEERAGOGY





FIRST FLOOR





FIRST FLOOR TRAIN





FIRST FLOOR TRAIN



FIRST FLOOR TRAIN





FITST FLOOR LEARNING ROOMS





FITST FLOOR LEARNING ROOMS





FITST FLOOR VIEW







Colour of Learning SPACE could change every day





Colour of SPACE changes every day





New Elements as a course in all Programmes of study

International Sign Language (IS) to be learned by all



InSign- Advancing inclusive education through International Sign







LEANING SPACES of the future

• Architectural Designs in short animation











STRATEGIC ACTIONS

How can we change current learning structures in school into project based learning structures and spaces?

3 Steps for change from Education 2.0 to Education 4.0

- Step 1. Secure digital learning through learning videos created by teachers.
- Step 2. Train and support teachers how to cooperate between different disciplines and how to develop(co-create) PB Learning & Creativity plans. Train and support teachers how to cooperate with other academics and industry and how to do PB related activities in hybrid environments.

Step 3. Create open spaces in current learning Infrastructures or build the new learning premises with more open spaces for project based cooperative work between students.



RESOURCES:



Running and proposed projects are creating new solutions for all levels of Education

Creating the critical mass









STEAME: Guidelines for Developing and Implementing STEAME Schools, <u>www.steame.eu</u> Completed 31.12.2021

Basis for evolution...







STEAME GOES HYBRID: Blueprint Guidelines and Policy Recommendations, <u>www.steame-hybrid.eu</u> Started 1.5.2021







SCHOOL LABEL









TTF

Teach the Future

Started 1.1.2022



BYOD-Learning Learning at Any Time, at Any Place via any Device <u>www.byod-learning.eu</u> Started 1.1.2022 LINK to the PLATFORM







 $E = MD^2$

E=MD^2: Excellence in Math Education through (e-)Debate and Diversity

https://excellenceinmath.eu/#competitions Started 1.2.2022

https://teachingthefuture.eu/#competitions



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FACILITATE – AI: Guidelines for facilitating the learning of Artificial Intelligence (AI) by School Students of Grades 7-12 <u>www.facilitate-ai.eu</u> Started 1.2.2022



REVEALING - REalisation of Virtual rEality LearnING Environments (VRLEs) for Higher Education <u>https://revealing-project.eu/</u> Started 1.2.2022



nodel enhanced by cloud technology b

ETRE: Empowering schools' transition readiness to a distance/hybrid learning model enhanced by cloud technology tools (http://etre-project.eu/) Started on 1 April 2021



ONLIFE: Empower Hybrid Competencies for ONLIFE Adaptable Teaching in School Education in times of pandemic, 59 (http://onlife.up.krakow.pl) Started on 1 June 2021





STEAME - STUDENTS

European Networking of STEAME School Students for Exchange and Co-creation

https://thalescyprus.com/?page_id=3386

Join the network: <u>https://docs.google.com/forms/d/e/1FAIpQLSexwglydReZRwyL-gnypwchSUDrOqGbR30RetuD0sjzDI7GVg/viewform</u>

(started 1 May 2022)



STEAMENTS STATES

European Networking of STEAME School Students for Exchange and Co-creation 2021-2-CY01-KA210-SCH-000047923

Presented by Dr Gregoris Makrides President, THALES Foundation



Co-funded by the European Union

Two Main Activities

Among others, in accomplishing our objectives



Activity 1: European Online Student Creations Exchange Forum – THE DISCORD PROJECT PLATFORM

Activity 2: Student Community Kick-Off Meeting - THE EUROPEAN STEAME SCHOOL STUDENTS NETWORK

What the student can do through the platform?

A. Posting problems and solutions

- Posting problems(60 sec) /Threads
- Posting solutions-answers(5 min)/Threads

Students are also invited to give STARS for best posting, problems or solutions. Best postings of the month with certificates to students.

B. STEAME Subjects teaching by school students

- presentations of 3 min video on STEAME Subjects
- Group presentations of upto 30 min for STEAME project based work.

Students are also invited to give STARS for best posting of 3 min presentation and STARS for the best Group presentation. Best presentations of the month and best group presentations of the month, will receive certificates.



What the student can do through the platform?

C. Live Meetings

Live meetings organized for presenting problems-solutions-discussing topics of common interest to students (these live meetings may be recorded)

Live meetings with specific agenda will be announced and programmed inviting all member students to join. Meetings may include discussion of problem solutions between the students, or discussion of presentations or discussing other topics of interest around STEAME learning

Most active students together with awards received under section A and B, will be invited to a physical networking meeting in Cracow, Poland 2023 to form a European Networking group of STEAME School Students



THE FIRST ever **STEANED** platform from Students for Students!



Use the QR code on the left for direct access to the STEAME Students platform. Crawl through an easy registration and explore a new universe in the familiar galaxy of STEAME DISCORD, a free voice, video and text chat app.

WEB-LINK

LINK to GF

https://forms.gle/WF9qb3JPdufxn8Rk9







Students are ready,we are not ready for them!







Next Expected Challenge

STEAME ACADEMY

STEAME TEACHER FACILITATORS ACADEMY

KA2 PROGRAMME TEACHER ACADEMIES

Submitted 7 September 2022

And the Puzzle of the Paradigm Shift would probably be completed

The yeast is ready.....lets make the bread!



We invest in the development of competence and skills

..... the competences to discover, recall and apply knowledge and the competence to self-adapt to change in technologies!





Ground for exchange of ideas and co-creation

EUROMATH & EUROSCIENCE 2023

Conference for school students and their teachers 11-15 March 2023, in Krakow, Poland



Watch Video – 60 sec

www.euromath.org









EUROPEAN STEAME CONFERENCE 2023

11-15 March 2023, in Krakow, Poland

www.steame.eu

EUROMATH & EUROSCIENCE 2023

VENUE: PEDAGOGICA UNIVERSITY OF CRACOW

DATE: 11 - 15 MARCH 2023









More STEAME Opportunities and challenges

The EUROPEAN STEAME Communication Competitions

For adults, with international participation

Pre-video submission for phase 1 is required

Communicate STEAME Subjects in 5 minutes and win your place at the finals of the European STEAME Communication Competition 2023









ΕΥΧΑΡΙΣΤΩ ΤΗΑΝΚΥΟυ Q&A

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BYOD-Learning

