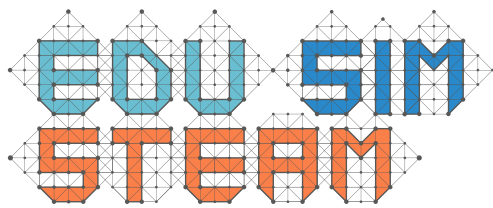




**DIRECTORATE GENERAL FOR
INNOVATION AND EDUCATIONAL
TECHNOLOGIES**



Transnational Meeting

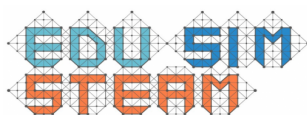
2020

EDUSIMSTEAM | Erasmus+ KA3 Forward Looking Cooperation Project



With the support of the
Erasmus+ Programme
of the European Union

Disclaimer | This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.



EDUSIMSTEAM / “WP-2 TEACHER TRAINING / CURRICULUM INTEGRATION” DESIGN ONLINE MEETING MINUTES

1. **Date:** 20/11/2020, 12-1:30 pm CET
2. **Meeting Facilitator:** Sumeyye Hatice Eral
3. **Attendees**

Present:

No	Organizations	Attendees
1	Blackrock Education Center (BEC)	Susan Gibney
2	Both Social	Piet Kommers
3	Both Social	Irene Weerkamp
4	CTEM Academy	Miguel Gonçalves
5	CTEM Academy	Carlos Silva
6	Education Department of Galicia	Luz Ares and her team
7	H2 Learning	Karolina Wójcik
8	Kaunas University of Technology	Robertas Damaševičius
9	Kaunas University of Technology	Ligita Zailskaite
10	Kaunas University of Technology	Rytis Maskeliūnas
11	METU	Erdinc Cakiroglu
12	MoNE, DGIET	Sümeyye Hatice ERAL
13	MoNE, DGIET	İpek Saralar-Aras
14	MoNE, DGIET	Tunç Erdal Akdur
15	MoNE, DGIET	Ceyda Özdemir
16	MoNE, DGIET	Büşra Söylemez
17	ROBOTSAN	Can KOYUNCU
18	Vilnius University	Anita Juškevičienė

4. Agenda

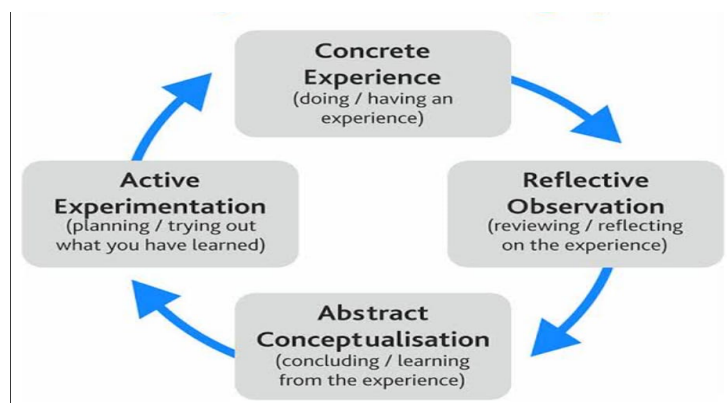
- Introduction
- İpek Saralar-Aras’s presentation on Plenary Discussion on WP-2 Teacher Training / Curriculum Integration
- Ligita Zailskaite’s presentation on Ideas for Training Curriculum
- Erdinc Cakiroglu’s presentation on Reflections on Pedagogical Model
- Discussion on training models and frameworks

5. Main Discussion

- Project coordinator Sumeyye Hatice Eral set the scene of the project and informed related to deliverable development process of the project.
- İpek Saralar-Aras from MoNE DGIET highlighted different ways of STEAM professional development and exemplified STEAM education platforms according to teachers' needs in Needs Analysis Report on her presentation.
- As WP-2 leader, Ligita Zailskaitė from Kaunas Technical University suggested some pedagogical methods, activities and resources like learners' research, problem solving, algorithmic thinking, critical computational thinking, collaborative learning skills, making and tinkering activities, robotics activities for training curriculum. In addition, she proposed some tools for the Online Platform Building on her presentation.
- Erdinc Cakiroglu from METU made a supportive presentation on Pedagogical Model to reflect on pedagogical design for STEAM. He defined pedagogical priorities as arts integration, skill-based, integrative and problem-based. He offered scenario-based learning activities to combine all these priorities.
- Sumeyye Hatice Eral invited all the participants to the breakout rooms so as to discuss on these issues:
 1. Which frameworks could be used as a reference to build such STEAM platform for teachers?
 2. Which training models/ modules could be integrated?
 3. Which training model could be developed to connect WPs? (WP-2,3,4)

Group 1

Piet Kommers from Both Social suggested Kolb's Learning Styles to create engaging custom eLearning. It can be illustrated as follow:



Group 2

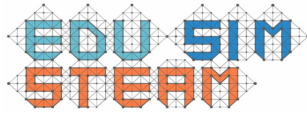
Susan Gibney from Blackrock Education Center summarized their group discussion like that:

- Contents of the training should have practical benefits for teachers; thus, they can apply what they have learned in their classrooms, experience what effects and consequences of the trainings and then share them with other teachers so as to develop their pedagogical competence.
- Related to the duration of the trainings, the 4-module model for this online training is good but it can be long because teachers are tired of such trainings during the remote education because of COVID-19. They suggested to be shortened or designed more interactive.

Group 3

Carlos Silva from CTEM Academy summarized group discussion and described the model of discussion. Accordingly, Luz Ares from Education Department of Galicia shared the below framework from ATS STEAM PROJECT as a suggestion.





In Training model/modules, the group emphasized on interdisciplinary approach rather than sticking to programming and robotics. In addition, they offered webinar as training model to connect WPs.

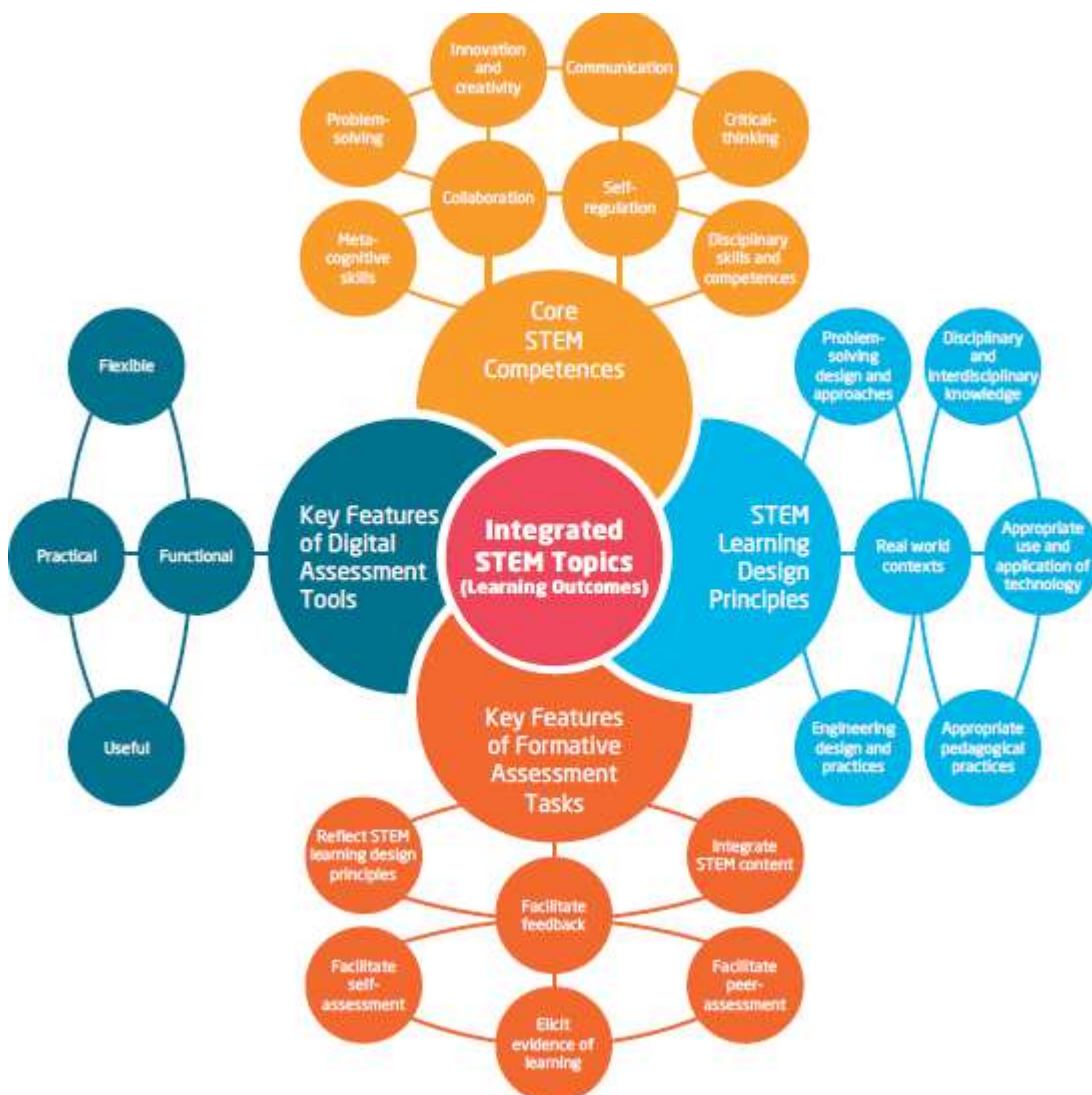
1. Which frameworks could be used as reference to build such STEAM platform for teachers?

A reference from coursera

European training module

A framework for STEAM not online was developed in another instance reaching 120 schools. Pilot Assessment of Transversal skills in STEM. (ATS STEAM PROJECT)

A structure, content, modules.

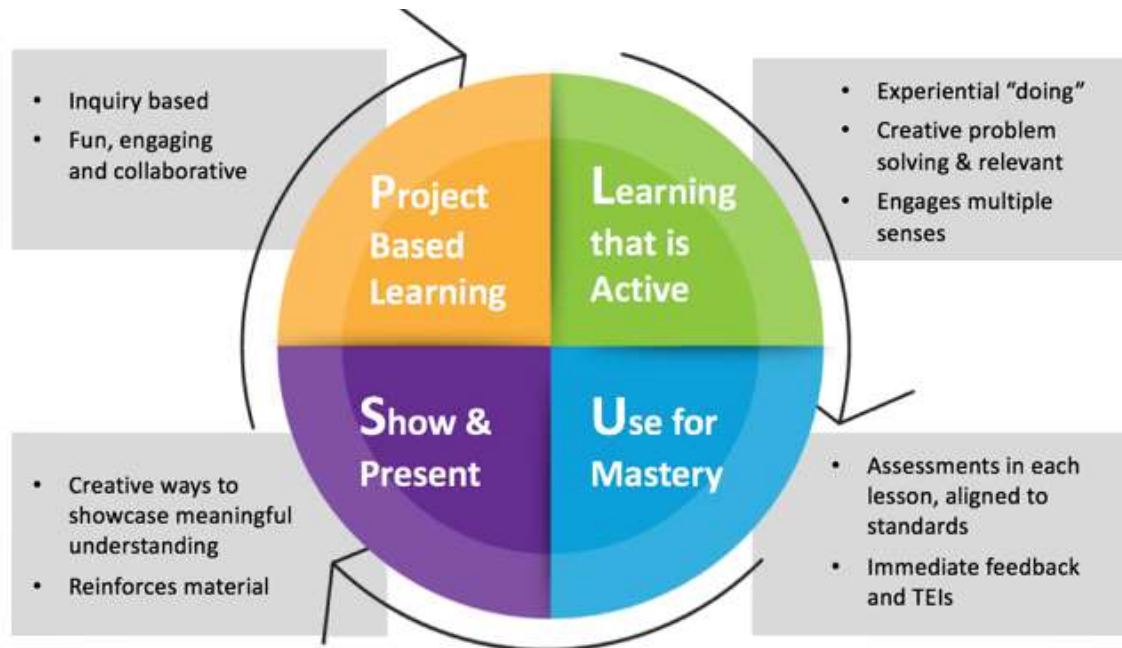


2. Which training models/ modules could be integrated?

Embedded systems

Problem solving approach

Project base learning



Try not to stick to programming and robotics to achieve problem solving, use some interdisciplinary approach to solve them

Critical thinking

Creativity and collaboration

Communication

3. Which training model could be developed to connect WPs? (WP-2,3,4)

Webinars (most of)

EDUSIMSTEAM

**REFLECTIONS ON
PEDAGOGICAL MODEL**

From WP-3 Perspective

METU



Defining STEAM

There is no single unifying definition of STEAM
(or even STEM)

Searching for **the** STEAM approach

Thinking about **a** STEAM approach

But we can **decide** on a sound pedagogical
framework that is suitable for our purposes.



Which learning outcomes?

Skills

- creativity, problem-solving, computational thinking, critical thinking, global collaboration, innovative thinking and communication

Knowledge

- Interdisciplinary
- Using existing knowledge to explore problems.
- Generating knowledge

Attitudes & values

- Towards engineering and science.

Experience



Constraints - Opportunities

Capabilities of the platform.

Cross-cultural nature

Robotics and algorithmic thinking

Others?



What should be our pedagogical priorities?

There is no single pedagogical approach for STEAM that is suitable for all needs.

Let's think about our priorities.



PRIORITIES - 1

Arts Integration

A shift from STEM to STEAM by linking science with other subjects and disciplines. “Arts” here is not limited to the visual arts but also related to social studies, history, physical arts, fine arts and music.

It is mostly related to students’ use of **imagination** and **creativity**.

- Adapting a “design thinking” framework into the STEM education can be a powerful approach to shifting towards STEAM education.
- Themes of the activities can be related to the subjects listed above.



PRIORITIES - 2

Skills-based

There is a focus on the core skills such as creativity, problem-solving, critical thinking, global collaboration, innovative thinking and communication.



PRIORITIES - 3

Integrative

STEAM education activities are interdisciplinary.

In each activity, there are connections to more than one science field (STEM fields) as well as to Art fields. The intensity and the nature of these connections may vary. While all activities are focusing on creative problem solving, sometimes a disciplinary connection may be obtained through a simple information brief, other times it can be in the core of problem solving.



PRIORITIES - 4

Problem-based

ill-structured, real-world related problems

STEAM learning activities may need to include learning goals about the basic tools (such as sensors or coding) but should obviously go beyond that. Embedding the “tool learning” goals into scenarios that involve problem solving, collaboration, and innovative thinking can be helpful in this sense.



HOW TO INTEGRATE ALL?

Scenario-based learning activities

Guided by a **pedagogical model**, scenarios can act as a virtual glue that can combine most of these priorities?

- Require active learning
- Problem-based (ill-structured)
- Require the application of subject knowledge as well as cyclical design-based approaches and skills.

- Relating to some subjects may be done through expository approaches.

THANK YOU

Erdinç Çakırođlu



**REPUBLIC OF TURKEY
MINISTRY OF NATIONAL
EDUCATION**

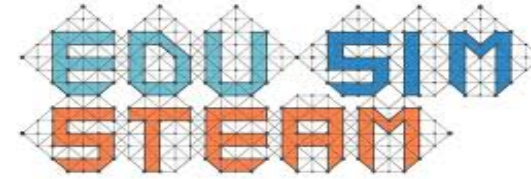
Plenary Discussion on WP-2

STEAM Training Curriculum for Teachers

Directorate General for Innovation and Educational Technologies

20/11/2020

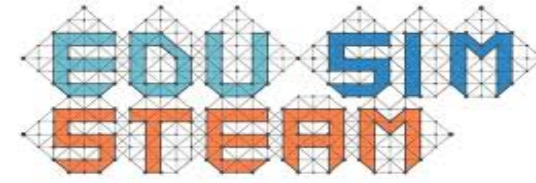
Presentation Overview



- Setting the Scene
 - Digital Education Frameworks
 - EduSimSteam Need Analysis Report
 - Teachers' Needs
- Exemplary STEAM Education Platforms
 - Canvas.net
 - CourseEra
 - European SchoolNet Academy
 - Teacher Academy by School Education Gateway
- Conclusion
- Discussion
 - Training models
 - Frameworks as references

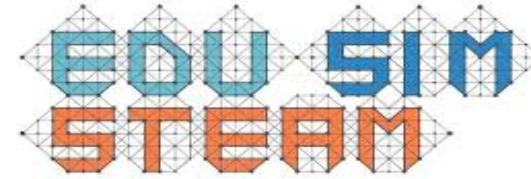


Setting the Scene



- T2-1 Establishing training framework and design generation
- T2-2 2nd Transnational Meeting in Lithuania: **Online Meeting**
- T2-3 Teacher Training Platform and Implementation of Pilot Training
- T2-4 Documenting Pilot Teacher Training

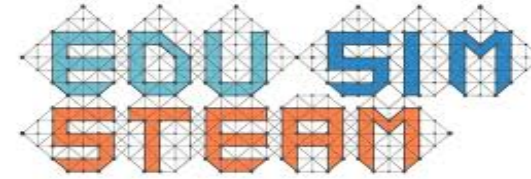
Setting the Scene



Available STEAM Frameworks for Professional Development

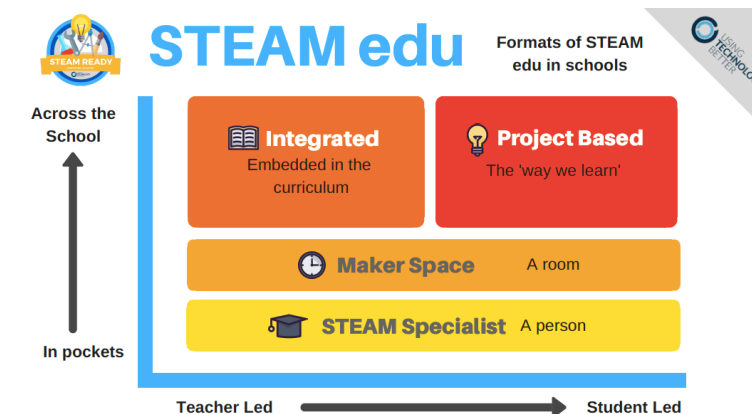
- DigiCompEdu (European Commission, 2017)
- A Highly Structured Collaborative STEAM Program: Enacting a Professional Development Framework (Bush et al., 2016)
- STEAM Education: An Overview of Creating a Model of Integrative Education (Setiawan et al., 2019)

Setting the Scene

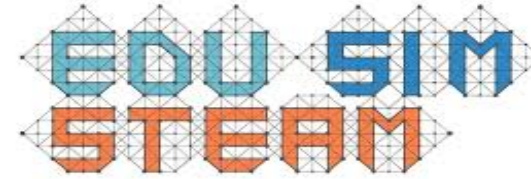


Available STEAM Frameworks for Professional Development

- **DigiCompEdu** (European Commission, 2017)
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Setting the Scene



STEAM edu

Formats of STEAM edu in schools



Across the School



In pockets

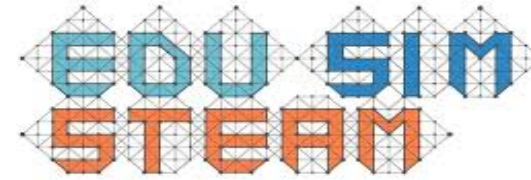


Teacher Led



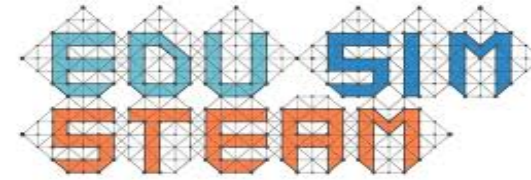
Student Led

Setting the Scene: Research on STEAM PD



- The foundation of effective PD is the improvement of student learning by improving teachers' knowledge, skills, attitudes, and practices (Guskey, 2000; Loucks-Horsley et al., 2010)
- Teacher PD has often been conducted in ways that are disconnected from classroom practice (workshop style, as in Darling-Hammond & Richardson, 2009), and as a result, has little long-term impact on classroom instruction.
- **Teacher learning should be situated within a context (Putnam and Borko, 2000).**
- PD that has a well-planned classroom implementation component can alter teachers' practice by impacting teachers' knowledge and skills through the actual practice of teaching (e.g., Borko, 2004; Greeno, Collins, & Resnick, 1996; Lave & Wenger, 1991).

Setting the Scene



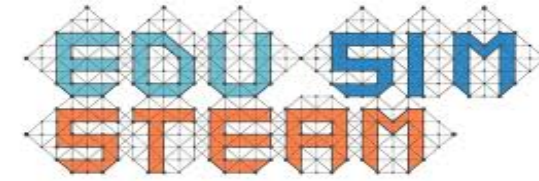
EduSimSteam Need Analysis Report Deliverable 1.2 Edusimsteam Needs Analysis Report

Participants

- Ireland (n=114),
- Lithuania (n=223),
- Netherlands (n=38),
- Portugal (n=123),
- Spain (n=310) and
- Turkey (n= 1121)



Teachers' Needs



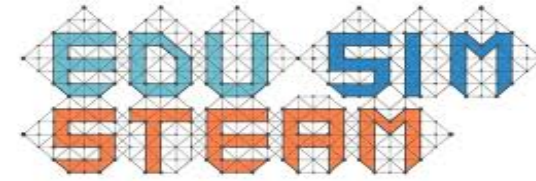
Type of courses on STEAM Education teachers would like to participate in by the percentage of teachers who chose them (%)

Country/Type	Ireland	Lithuania	Netherlands	Portugal	Spain	Turkey
MOOC	12.86	26.96	55.56	55.17	32.66	67.98
Webinar	70.00	70.43	44.44	72.41	50.25	68.12
Face-to-face training	61.43	53.91	11.12	31.03	50.26	66.23
Traditional lecture	17.14	12.17	11.11	20.69	24.12	16.45
Other	5.71	8.70	NA	10.34	31.16	6.11

K-12 (and university) teachers
Webinars vs. interactive ways



Ideas for STEAM Education Platforms



- Canvas.net



- Coursera



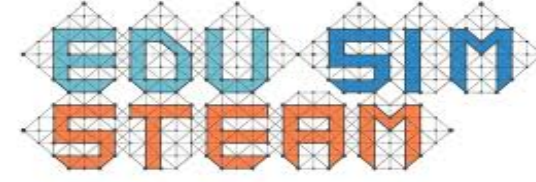
- European SchoolNet Academy



- Teacher Academy




Canvas.net



Supporting Girls in STEAM (K-12/ HE)

canvas NETWORK

About Us | Take a Course | Login



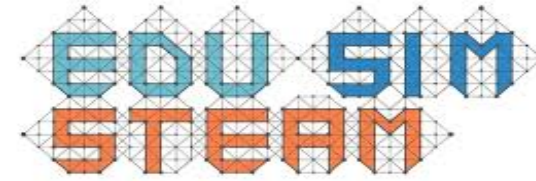
ENROLL

SUPPORTING GIRLS IN STEAM (K-12/HE)

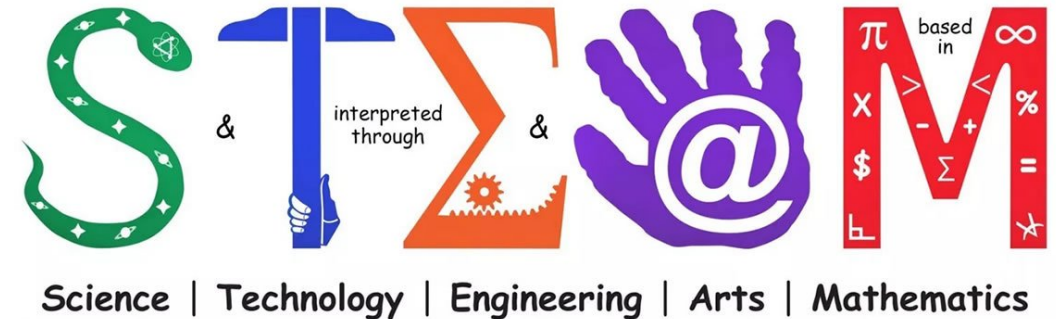
Self-paced

COURSE DATE: Ongoing	DURATION: 3 weeks	COMMITMENT: 1 hr/week
REQUIREMENT: None	COURSE TYPE: Self-paced	CREDENTIAL: None

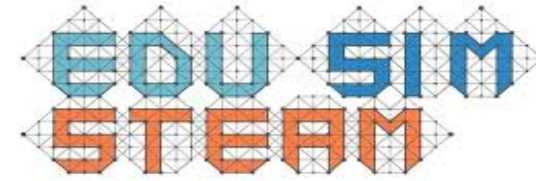
Canvas.net



- [STEAM CAMP – Do It Yourself](#)
- **Created by:** Canvas.net
- **Designed for:** Teachers who may be interested in creating their own STEAM CAMP based upon a proven model created by Jennifer Miller and Sandra Wozniak.
- Incorporated NASA MMS Challenge curriculum, authored by Jennifer Miller, Sandra Wozniak, and Tom Chambers, along with other NASA Magnetospheric Multiscale (MMS) fabrication resources.



Learning Outcomes



- Build an EXTREME Weather Makerspace, SolarSolv Makerspace, and Habitat Makerspace environment using free resources.
- Use a STEAM (science, technology, art, and math) framework to map creative approaches to core content needs.
- Implement 3D printing software programs, computational thinking activities, green screen, and other STEM programs.
- Connect with top scientists, educators, engineers, artists, and community organizers to share best practices for achieving community buy-in.
- Identify funding opportunities and gain insights about how to connect your organization's makerspace to community partners.

Learning Outcomes



Makerspace

STEAM (science, technology, art, and math) framework
core content needs

3D printing software programs

STEM programs

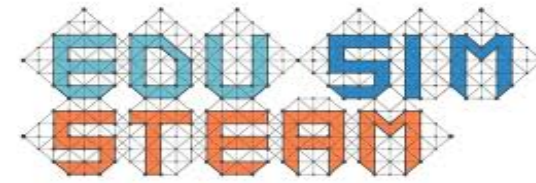
and

- Connect

share best practices

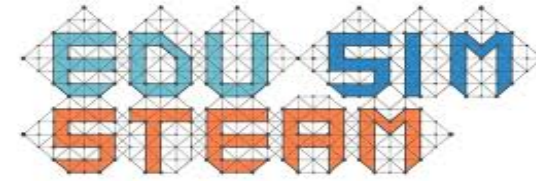
community partners

Coursera



The screenshot shows a web browser window displaying the Coursera course page for 'Introduction to STEM'. The browser's address bar shows the URL 'coursera.org/lecture/stem/course-overview-introduction-to-stem-FaD4H'. The Coursera navigation bar includes the logo, an 'Explore' dropdown, a search bar with the text 'What do you want to learn?', and links for 'For Enterprise', 'For Students', 'Log In', and 'Join for Free'. A blue banner below the navigation bar states '3 trial videos available. Create an account to watch unlimited course videos.' and includes a 'Join for free' button. The main content area features the course title 'Course Overview: Introduction to STEM' with a 'Share' link. Below the title is a large video player with a dark blue background and the text 'Are you interested in learning about the environment?' and a play button icon. At the bottom of the page, there is a course card for 'English for Science, Technology, Engineering, and Mathematics' by the University of Pennsylvania, which has a 4.8 rating from 1,698 reviews and 130K students enrolled. An 'Enroll for Free' button is positioned to the right of the course card. At the very bottom, there are links for 'This Course' and 'Video Transcript'.

Coursera



- **Course name: Introduction to STEM**

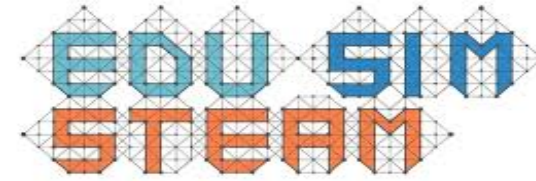


- **Content:** English for STEM

«Syllabus: What you will learn from this course»

- Unit 1: Is the Earth Getting Warmer? (7 hours to complete)
 - Unit 2: The Greenhouse Effect (7 hours to complete)
 - Unit 3: The Impacts of Climate Change on our World (6 hours to complete)
 - Unit 4: Discovering Cleaner Energy Sources to Power the World (7 hours to complete)
- **Duration:** 4 weeks
 - **Place:** Online

Coursera



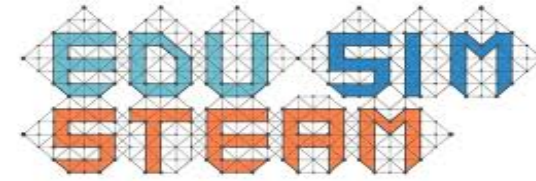
- **Course name:** The STEAM Movement
- **Content:** Biology Across Disciplines: The Arts and Biology



«In this module, we'll explore the intersection of biology with the fine arts.»

- Unit 1: Introduction (3 hours to complete)
 - Unit 2: Art as Foundational to Biology (1 hour to complete)
 - Unit 3: Art to Communicate Biology (3 hours to complete)
 - Unit 4: The STEAM Movement (3 hours to complete)
-
- **Duration:** 4 weeks
 - **Place:** Online

European SchoolNet Academy



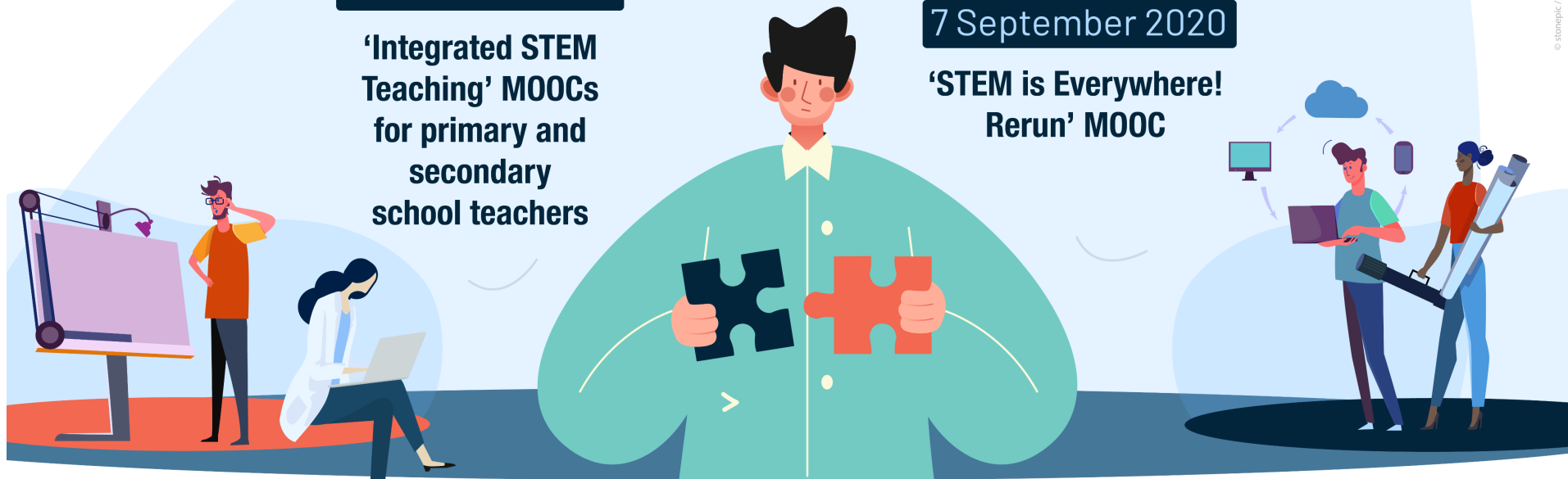
Enrol for the STEM MOOCS PACKAGE

26 October 2020

'Integrated STEM Teaching' MOOCs for primary and secondary school teachers

7 September 2020

'STEM is Everywhere! Rerun' MOOC

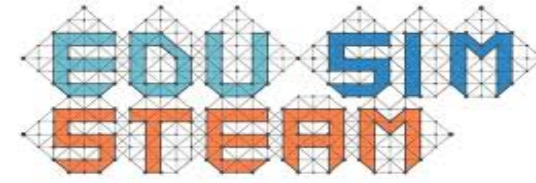


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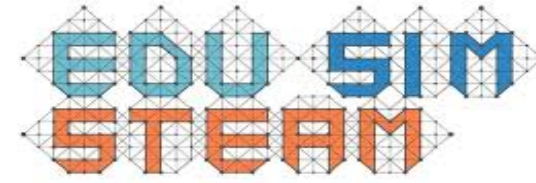
The 'STEM is Everywhere! (rerun)' MOOC has been funded under the European Union's H2020 research and innovation programme – project Scientix4, coordinated by European Schoolnet (EUN) and the 'Integrated STEM Teaching' MOOCs for primary and secondary school teachers are co-funded by the STE(A)M IT and Scientix 4 projects. STE(A)M IT have received funding from the European Union's ERASMUS+ programme (Grant agreement 612845-EPP-1-2019-1-BE-EPPKA3-PH-FORWARD), coordinated by European Schoolnet (EUN). The content of the document is the sole responsibility of the organizer and it does not represent the opinion of the European Union or the Education, Audiovisual and Culture Executive Agency, which are not responsible for any use that might be made of the information contained.

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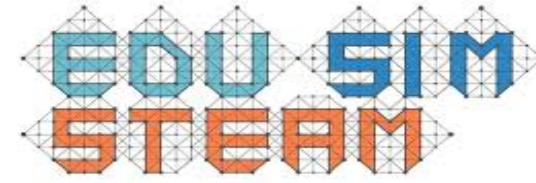
The screenshot shows a web browser window with the URL europeanschoolnetacademy.eu/courses/course-v1:Scientix+STEMeverywhere+2018/about. The page header includes the European SchoolNet Academy logo, the course title 'Scientix: STEMeverywhere STEM Is Everywhere!', and navigation links for 'Course Catalogue', 'FAQ', 'Blog', and 'About'. There are 'Register' and 'Sign in' buttons. The main content area features a blue banner with STEM-related icons (book, lightbulb, microscope, beaker, robot) and the text 'STEM Is Everywhere! Scientix'. A large blue button says 'Enroll in STEMeverywhere'. On the right, there is a promotional image of diverse students with the 'SCIENTIX' and 'European SchoolNet Academy' logos. At the bottom right of the image, there is a small disclaimer: 'This logo generated in the PRO-CEP (Project for the Development of the European SchoolNet Academy) project, funded by the European Union. The content of the PRO-CEP is the sole responsibility of the project partners and does not represent the opinion of the European Commission (EC), and the EC is not responsible for any use that may be made of it without its consent.'

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- **Course name:** [STEM is Everywhere!](#)
- **Content:** «Modules»
 - Module 1: Towards 21st-century STEM education
 - Module 2: Real-world problems for STEM subjects
 - Module 3: Interdisciplinary STEM teaching with real-world problems
 - Module 4: Submit your real-world STEM lesson plan!
- **Duration:** 4 weeks
- **Place:** Online

Learning Objectives



- Identify STEM in everyday life and learn how to integrate real-world STEM problems in your lessons
- Build confidence in trying out new methods in the classroom, such as an interdisciplinary approach
- Explore a range of resources, tools and strategies for activities that enhance STEM in real life
- Learn about 21st-century skills and how to address them in the classroom
- Review the work of course peers
- Connect with other course participants
- Reflect on your professional practice, beliefs and learning

Learning Objectives



STEM in everyday life
problems in your lessons

STEM

confidence
interdisciplinary approach

new methods

resources, tools and strategies
STEM in real life

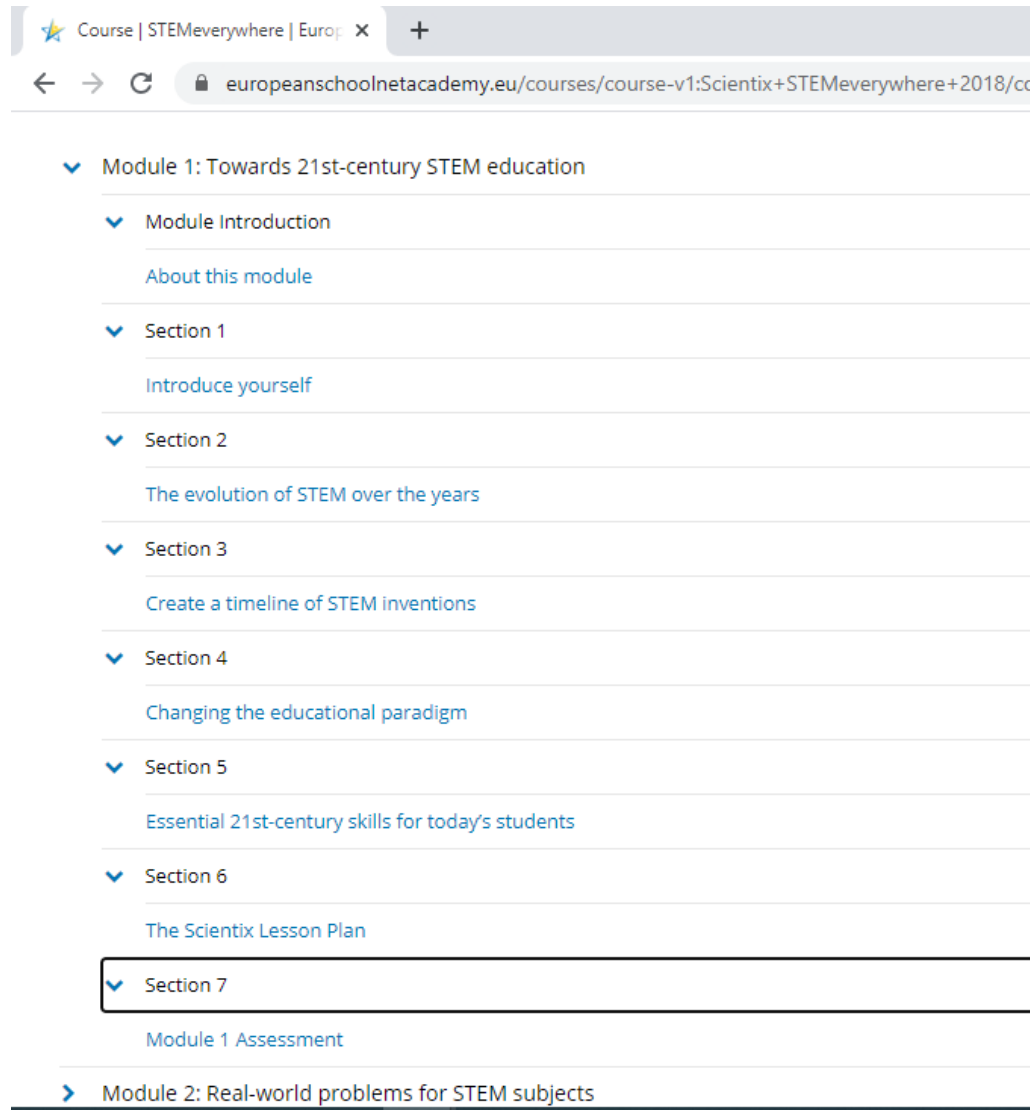
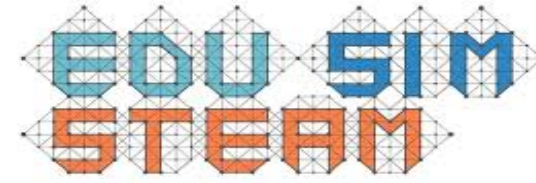
21st-century skills

course peers

- Connect

professional practice, beliefs and learning

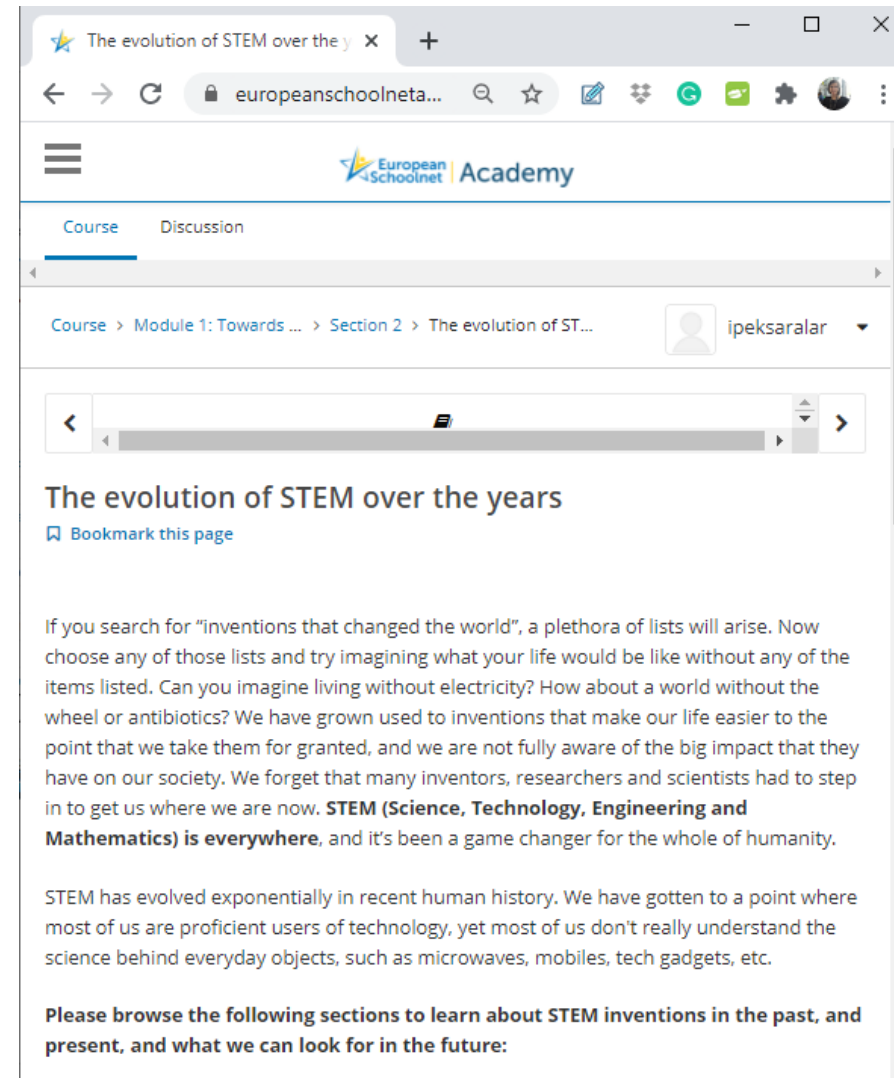
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Course | STEMeverywhere | Euro: x +

← → ↻ europeanschoolnetacademy.eu/courses/course-v1:Scientix+STEMeverywhere+2018/cc

- Module 1: Towards 21st-century STEM education
 - Module Introduction
 - About this module
 - Section 1
 - Introduce yourself
 - Section 2
 - The evolution of STEM over the years
 - Section 3
 - Create a timeline of STEM inventions
 - Section 4
 - Changing the educational paradigm
 - Section 5
 - Essential 21st-century skills for today's students
 - Section 6
 - The Scientix Lesson Plan
 - Section 7
 - Module 1 Assessment
- Module 2: Real-world problems for STEM subjects



The evolution of STEM over the y x +

← → ↻ europeanschoolnet... 🔍 ☆ 📄 🌐 🗄️ 👤 ⋮

European Schoolnet Academy

Course Discussion

Course > Module 1: Towards ... > Section 2 > The evolution of ST... ipeksaralar

The evolution of STEM over the years

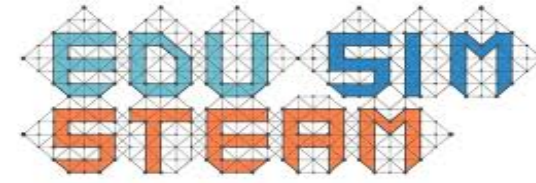
[Bookmark this page](#)

If you search for “inventions that changed the world”, a plethora of lists will arise. Now choose any of those lists and try imagining what your life would be like without any of the items listed. Can you imagine living without electricity? How about a world without the wheel or antibiotics? We have grown used to inventions that make our life easier to the point that we take them for granted, and we are not fully aware of the big impact that they have on our society. We forget that many inventors, researchers and scientists had to step in to get us where we are now. **STEM (Science, Technology, Engineering and Mathematics) is everywhere**, and it's been a game changer for the whole of humanity.

STEM has evolved exponentially in recent human history. We have gotten to a point where most of us are proficient users of technology, yet most of us don't really understand the science behind everyday objects, such as microwaves, mobiles, tech gadgets, etc.

Please browse the following sections to learn about STEM inventions in the past, and present, and what we can look for in the future:

European SchoolNet Academy



Create a timeline of STEM inventions

Course Discussion

Course > Module 1: Towards 21st-century STEM education > Section 3 > Create a timeline of STEM inventions

Previous Next

Create a timeline of STEM inventions

[Bookmark this page](#)

Activity

Create a **timeline of STEM inventions in your country** and share it on the Padlet below. If you wish, you can use [this template \(click here to download the template\)](#), or you can use any other tool you want.

padlet

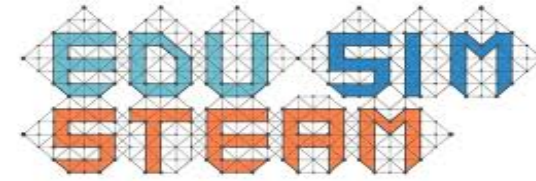
EUN Partnership aisbl + 751 · 1mo

Create a timeline of STEM inventions

Create a timeline of STEM inventions in your country and share it on the Padlet below. If you wish, you can use the template that we have prepared for you, or you can use any other tool you want. We can't wait to see your amazing timelines. You can also ask your students to do the same, create a timeline or video and share it.

İsmail Erdoğan, Çanakkale, Türkiye	Emre Bayrak TURKEY	İLKNUR GÖZERİ/ İstanbul/Turkey	Template Here is the template you can use to create your timeline:	Timeline STEM
Benito Vázquez		Timeline of STEM Inventions in Turkey		Serdar- Turks' Timeline STEM

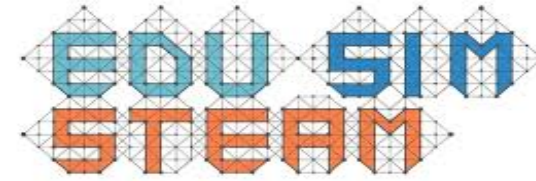
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- **Course name:** Integrated STEM Teaching for Primary Schools
- **Content:** «Modules»
 - Module 1: Introduction to integrated STE(A)M teaching & relevant pedagogies - opens on 26/10/2020
 - Module 2: STEM subjects and how STEM careers are contextualized at school - opens on 02/11/2020
 - Module 3: Examples of Integrated STEM teaching and Learning Scenarios - opens on 09/11/2020
 - Module 4: Create your learning scenario and peer-assessment - opens on 16/11/2020
- **Duration:** 4 weeks
- **Place:** Online



European SchoolNet Academy




Integrated STEM Teaching for Pri x +

europeschoolnetacademy.eu/courses/course-v1:STEAM_IT+IntegrSTEM_Primary+2020/about

Integrated STEM Teaching for Primary Schools

STEAM_IT

[Enroll in IntegrSTEM_Primary](#)



Welcome to the *Integrated STEM Teaching for Primary Schools* MOOC

[Course Code](#) **IntegrSTEM_Primary**


[Classes Start](#) **Oct 26, 2020**

[Classes End](#) **Dec 3, 2020**

[Estimated Effort](#) **5 hours (20 in total)**

[On this page](#)

- [About the course](#)
- [Learning objectives](#)
- [Prerequisites](#)
- [Modules](#)
- [Certification](#)
- [Course staff](#)
- [Disclaimer & copyright](#)

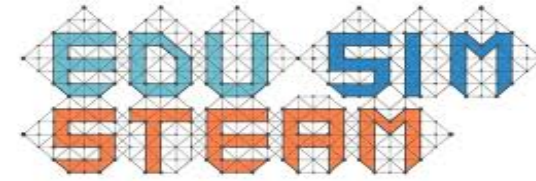


Integrated STEM Teaching MOOCs for
NEW MOOCs
INTEGRATED STEM TEACHING
for primary school teachers & secondary school teachers
#STEAMITMOOCs

START
26 October 2020
Register now!

Watch later
Share

European SchoolNet Academy



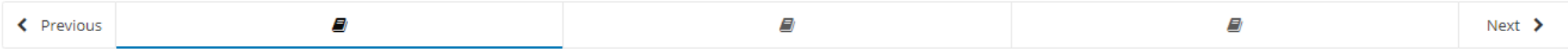
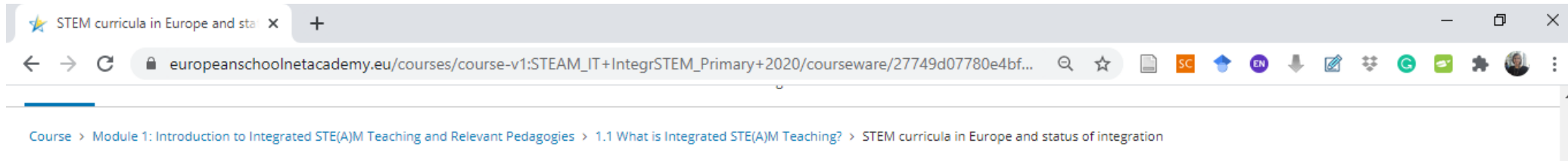
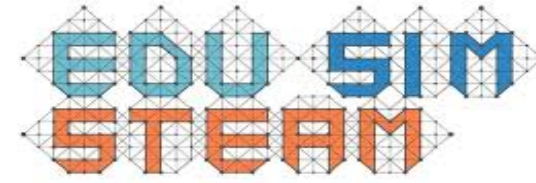
The screenshot shows a web browser window with the URL europeanschoolnetacademy.eu/courses/course-v1:STEAM_IT+IntegrSTEM_Primary+2020/course/. The page content includes a navigation menu on the left with the following items:

- Module 1: Introduction to Integrated STE(A)M Teaching and Relevant Pedagogies
 - 1.0 Module Introduction
 - 1.1 What is Integrated STE(A)M Teaching?
 - [STEM curricula in Europe and status of integration](#)
 - [Why do we need integrated STEM?](#)
 - [Cross-curricular teaching and your experience](#)
 - 1.2 Pedagogical Approaches and Trends for the STEM Classroom
 - 1.3 The STE(A)M IT Master Learning Scenario Template
 - 1.4 Module round-up
 - Quiz due Dec 3, 2020 01:59 +03
- Module 2: STEM Subjects and How STEM Careers Are Contextualized at School
- Module 3: Examples of Integrated STEM Teaching and Learning Scenarios
- Module 4: Create Your Learning Scenario and Peer-Assessment

On the right side of the page, there is a sidebar with the following sections:

- [STE\(A\)M IT Master Learning Scenario Template](#)
- [STE\(A\)M IT Rubric](#)
- Surveys**
 - [Take our pre-course survey](#)
 - [Take our pre-course survey](#)
- Join us on social media**
 - [Join our Facebook Group](#)
 - [Tweet #STEAMIT_project](#)
- Are you ready to take this MOOC?**
 - Take this short [readiness self-assessment](#) and find out!

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STEM curricula in Europe and status of integration

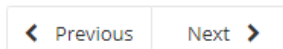
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STEM education is recognised as a priority in Europe by public and educational authorities. However, students' interest in pursuing STEM-related studies and careers has not been increasing despite the rapid developments in science and technology. In an effort to reverse this trend, the combination of all of the four disciplines of science, technology, engineering, mathematics as well as non-science classes (**the (A) as in "all"**) into one class, unit, or lesson that is based on connections between the subjects and real-world problems, led to the idea of **Integrated STE(A)M teaching**.

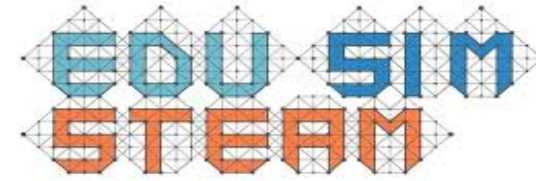
Integrated STE(A)M teaching reflects the effort to combine some or all four disciplines of **Science, Technology, Engineering, and Mathematics with at least one non-science subject (i.e. literature, history, economics, language classes etc.) into one learning unit or lesson**.

In Europe, there is no **integrated STE(A)M education framework** of reference, and the STE(A)M IT project leads the way in the creation and testing of the **1st Integrated STE(A)M framework**. More particularly, the objective is to develop more coherence in STE(A)M education by defining collectively with **Ministries of Education (MoEs), industry and STEM teachers (via a co-construction process) the concept of integrated STE(A)M education**. This is supported by the development, with a focus group of STE(A)M teachers, of interdisciplinary innovative teaching and learning scenarios that will be used to test the proposed framework of reference for integrated STE(A)M education. In addition, the STE(A)M education movement provides the possibility to develop innovative and creative approaches for interdisciplinary STEM education projects enabling the integration of STEM and non-STEM subjects to be interlinked.

In this MOOC, we will explore the aforementioned concepts and ideas.



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- **Course name:** Integrated STEM Teaching for Secondary Schools
- **Content:** «Modules»
 - Module 1: Introduction to integrated STE(A)M teaching & relevant pedagogies - opens on 26/10/2020
 - Module 2: STEM subjects and how STEM careers are contextualized at school - opens on 02/11/2020
 - Module 3: Examples of Integrated STEM teaching and Learning Scenarios - opens on 09/11/2020
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- **Place:** Online



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Integrated STEM Teaching for Se x +

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Integrated STEM Teaching for Secondary Schools
STEAM_IT

Enroll in IntegrSTEM_Secondary

Welcome to the *Integrated STEM Teaching for Secondary Schools* MOOC

Integrated STEM Teaching MOOCs for Primary and Second...

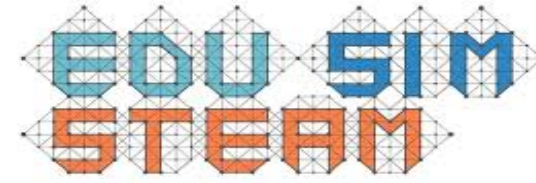
On this page

- About the course
- Learning objectives
- Prerequisites
- Modules
- Certification
- Course staff
- Disclaimer & copyright

🐦 👍 ✉

📄 Course Code	IntegrSTEM_Secondary
📅 Classes Start	Oct 26, 2020
📅 Classes End	Dec 3, 2020
🕒 Estimated Effort	5 hours (20 in total)

European SchoolNet Academy




Course | IntegrSTEM_Secondary | x +

← → ↻ europeanschoolnetacademy.eu/courses/course-v1:STEAM_IT+IntegrSTEM_Secondary+2020/course/ 🔍 ☆ 📄 SC 📄 EN ⬇️ 📄 📄 📄 📄 📄 📄 📄 📄

European SchoolNet Academy STEAM_IT: IntegrSTEM_Secondary Integrated STEM Teaching for Secondary Schools My courses Course Catalogue FAQ Blog About 👤 ipeksaralar ▾

Course Discussion Teams Live Events Meet Your Peers Behind the Course Certification Progress

Integrated STEM Teaching for Secondary Schools Resume Course

 This course is ending in 2 weeks on Dec 3, 2020.
To earn a certificate, you must complete all requirements before this date.

We are already in Module 4, and the final assessment has started. Therefore, feedback such as "Thank you", "Well done", "Congrats", etc. is not constructive feedback and as such is not eligible for the course certificate. You can read more about constructive feedback in peer assessment instructions. **We will do spot checks** to make sure that your learning scenarios and your reviews are following instructions. **If they are not according to the instructions, your certificate will be revoked!** Also, we want to give you a quick reminder that if you've been assigned a work that is **not in English**, or is **not publicly accessible**, or in general **does not follow the instructions** please respond "No" to the last question, "In general, does the activity meet the aforementioned requirements?" Good luck with Module 4 and the peer assessment! 😊

Expand All

Module 1: Title with Caps Except Most Prepositions/Conjunctions

- 1.0 Module Introduction
 - About this module ✓
 - What is STE(A)M?

Course Tools

- Bookmarks
- Updates

Important Course Dates

Today is Nov 18, 2020 12:16 +03

Course End
in 2 weeks - Dec 3, 2020

To earn a certificate, you must complete all requirements before this date.

Course Handouts

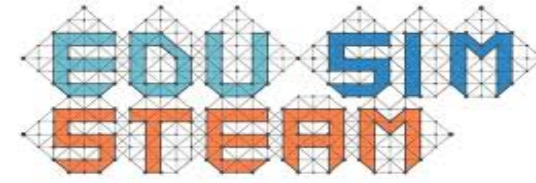
- STE(A)M IT Master Learning Scenario Template
- STE(A)M IT Rubric

Surveys

- Take our pre-course survey
- Take our pre-course survey

Join us on social media

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Otomatik Kaydet STE_A_M-IT_Master_LS_template_Final - Word İpek Saralar

Dosya Giriş Ekle Tasarım Düzen Başvurular Posta Gönderile Gözden Geçir Gö

STEAM IT European Schoolnet IND IRE ISTITUTO NAZIONALE DOCUMENTAZIONE INNOVAZIONE RICERCA EDUCATIVA Ministero znanosti i obrazovanja REPÚBLICA PORTUGUESA EDUCAÇÃO University of Cyprus IUL

STE(A)M IT INTEGRATED LESSON

Title

Authors

Summary

Licenses

Attribution CC BY. This license lets others distribute, commercially, if they credit you for the original creation. This is the most common for maximum dissemination and use of licensed materials.

Subject (s)

Please list in detail the subjects taught in this lesson and briefly explain why including the link of the non-STEM subjects and their use in improving the lesson.

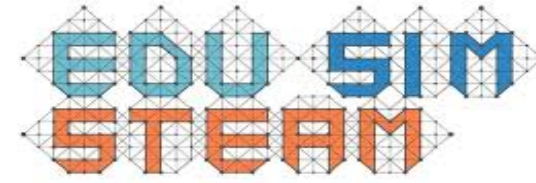
Real- life questions

Aims of the lesson



STE(A)M IT Learning Scenario Evaluation Rubric

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Dashboard | European SchoolNet x +


← → ↻ europeanschoolnetacademy.eu/dashboard 🔍 ☆ 📄 SC 📄 EN ⬇️ 📄 📄 📄 📄 📄 📄 📄 📄

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My Courses


Whether you are waiting for an upcoming course to start, want to continue learning or are curious to explore an archived course... your learning journey starts here.

My Courses




Integrated STEM Teaching for Secondary Schools
STEAM_IT - IntegrSTEM_Secondary
Started - Oct 26, 2020

⚙️ [Resume Course](#)



Integrated STEM Teaching for Primary Schools
STEAM_IT - IntegrSTEM_Primary
Started - Oct 26, 2020

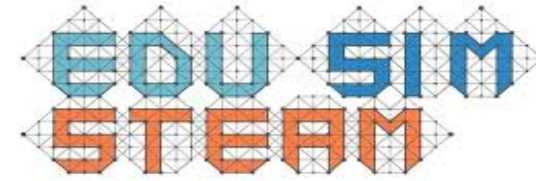
⚙️ [Resume Course](#)



STEM Is Everywhere!
Scientix - STEMeverywhere
Ended - Dec 5, 2018

⚙️ [View Archived Course](#)

Teacher Academy



STEAM Education > Course for Teachers

teacheracademy.eu/course/steam-education/

Home | Course Dates | About Us | Newsletter | **Blog** | [f](#) [@](#) [in](#) [t](#) [v](#)

Discover more ... **Search** Need help? ▾

euro pass teacher academy

FACE-TO-FACE COURSES ▾ ONLINE COURSES ▾ LOCATIONS ▾ FUNDING ▾ **ENROLLMENT**

Code: ART1.STEAM

From STEM to STEAM Education: A New Learning Approach

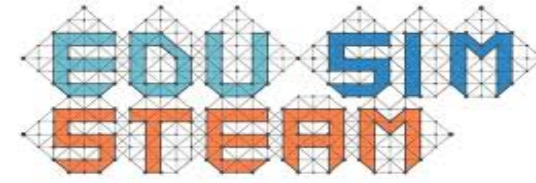
One-Week course in Barcelona, Berlin and Nice

- [Description](#)
- [Learning Outcomes](#)
- [Audience](#)

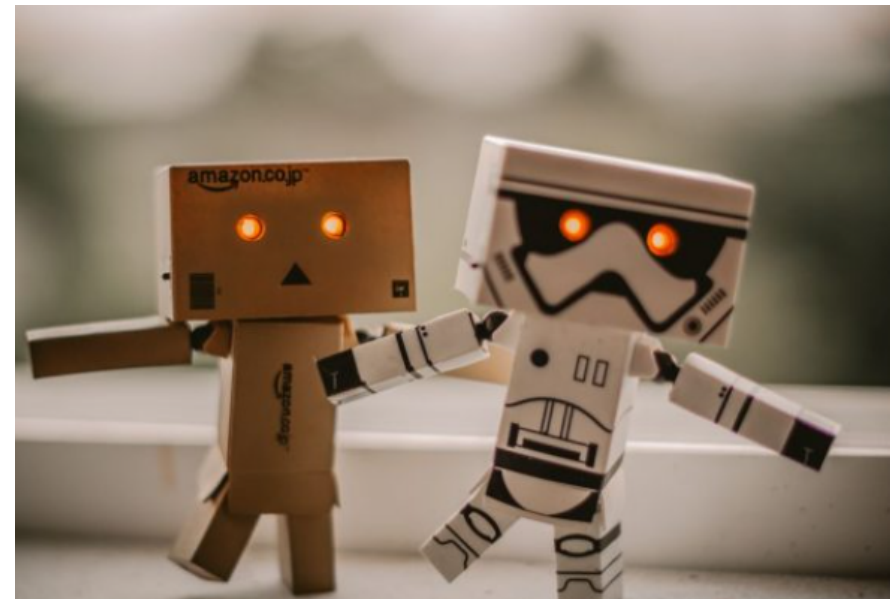
[Register here](#)

A photograph of two cardboard robots. One is a brown cardboard box robot with 'amazon.co.jp' printed on its head and two glowing orange lights for eyes. The other is a white cardboard robot with a Stormtrooper helmet design and two glowing orange lights for eyes. They are standing on a white surface against a blurred background.

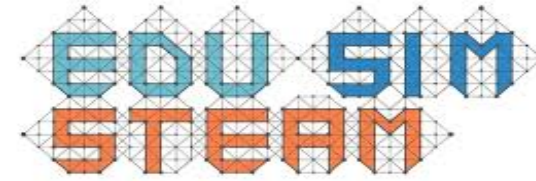
Teacher Academy



- **Course name:** [From STEM to STEAM Education: A New Approach](#)
- **Frequency:** Every month
- **Duration:** A week
- **Place:** Barcelona, Berlin, Nice



Teacher Academy



- [From STEM to STEAM Education: A New Approach](#)

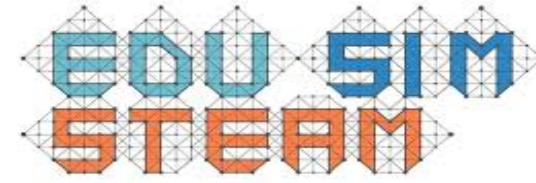
Audience

- Primary, secondary, vocational, adult, special needs teachers
- Teacher trainers;
- Headteachers;
- Principals;
- Managers of schools.

TeacherAcademy

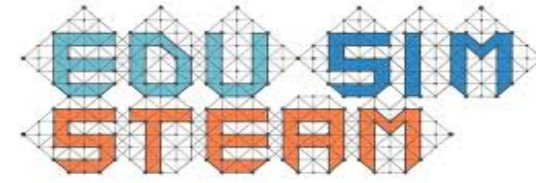


Learning Outcomes



- Identify the key features of STEM and STEAM.
- Define learning objectives that integrate STEM and Art & Design subjects to increase student engagement in learning.
- Connect and relate different subjects through creative STEAM activities, based on real-life and concrete experiences.
- Build an authentic STEAM lesson.
- Trust the importance of play, fun, and engagement in learning.
- Incorporate art and design-related skills into the general learning environment and curriculum.

Learning Outcomes



key features of STEM and STEAM

learning objectives that integrate STEM and Art

real-life and concrete experiences

an authentic STEAM lesson

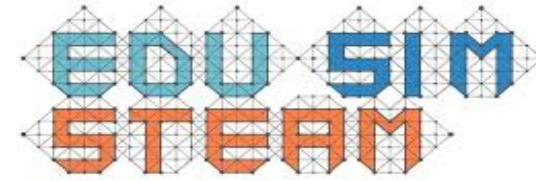
play, fun, and engagement in learning

general learning

environment and curriculum

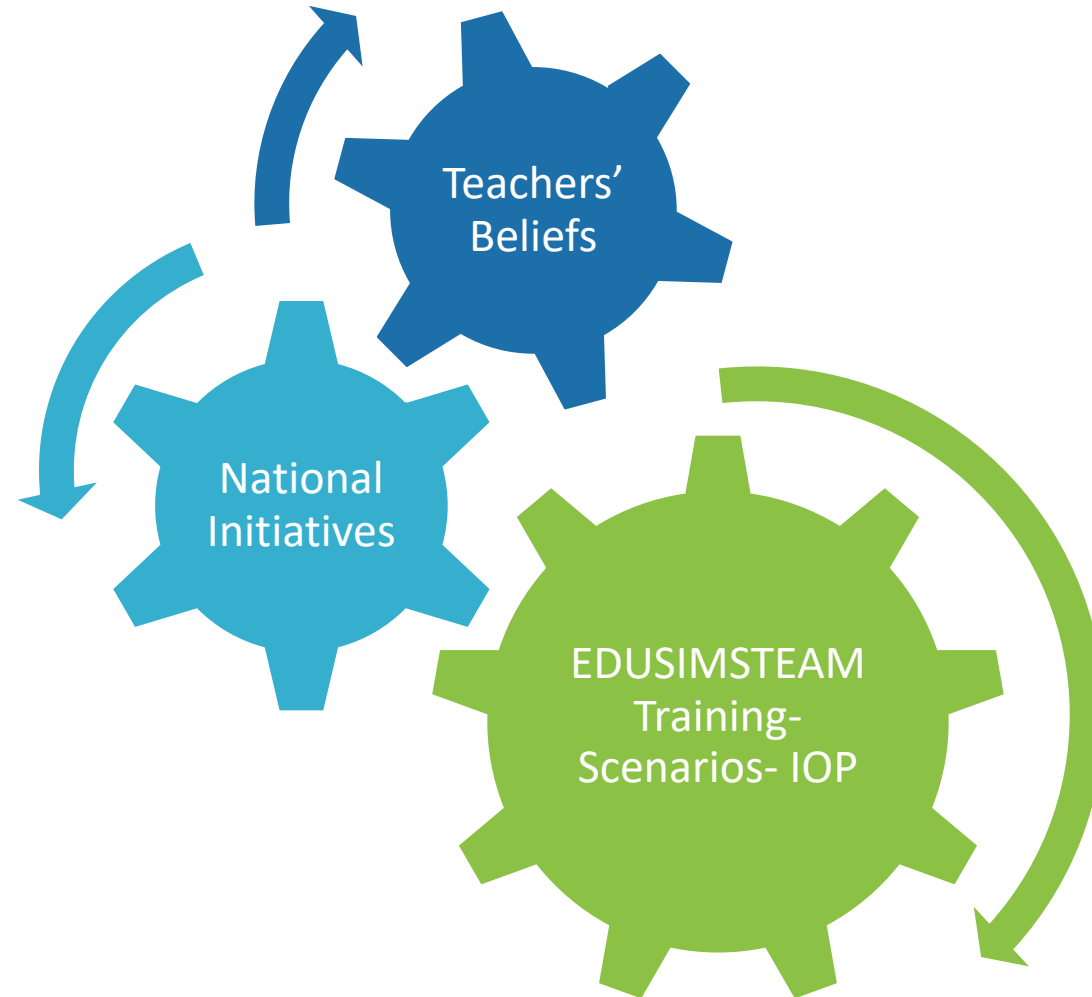
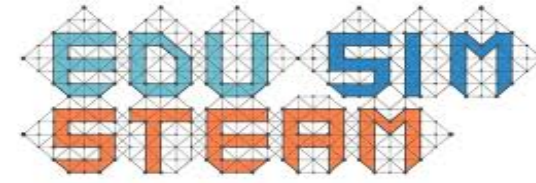
TeacherAcademy

Conclusion

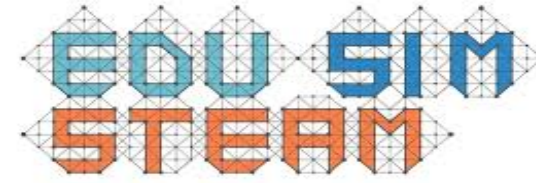


- Different ways of STEAM Professional Development
- Collaborative, Integrative, Project-based Approaches
- Teachers are used to webinars, and MOOCs: Need analysis
- There is a need for interactive, practice-based PD for STEAM
- Real-life/Daily life and concrete experiences
- Interdisciplinary approach and new methods

Discussion



Discussion



Which frameworks could be used as a reference to build such STEAM platform for teachers?

Which training models/ modules could be integrated?

Which training model could be developed to connect WPs?
(WP-2,3,4)



**REPUBLIC OF TURKEY
MINISTRY OF NATIONAL
EDUCATION**

THANK YOU

EDUSIMSTEAM Project Management Team

<http://edusimsteam.eba.gov.tr/>

20/11/2020



Ideas for Training Curriculum

**Project „Fostering STEAM
Education in Schools
(EDUSIMSTEAM)“**

2020-11-20

WP2 Teacher Training & Training Curriculum

- The aim is to **provide online training to all teachers in K12** schools by using the data results of WP1 in order to be able to incorporate STEAM skills into their curriculum.
- Project team plan to focus on **robotic and algorithmic thinking for teacher trainings**; they will use STEAM approach through the medias of robots and robotic programs.
- Then, a **curriculum will be prepared for teacher education** in order to **gain the skills of robotics literacy and algorithmic thinking** at the international level.
- The prepared curriculum will be used during the teacher training process and will **be open to access for teachers after the project.**

Problems related to STEM-oriented skills integration

Integration STEM-oriented skills into the school curriculum related with such **challenges as:**

- using technological toys;
- increasing the role of the teacher as a mentor in STEM classes introducing after-school activities related to STEM;
- focusing on active learning based courses.

Problems Related to Technology

The choice of appropriate technological tools:

- in creating adequate technological infrastructures to support collaboration;
- for monitoring and programming easiness;
- using the fully configurable user interface;
- making improvements in STEM learning using robotics.

Pedagogical Methods, Activities and Resources Include

Pedagogical methods, activities and resources include:

- providing learners' research, problem solving,
- critical computational thinking,
- collaborative learning skills
- making and tinkering activities,
- including robotics activities.

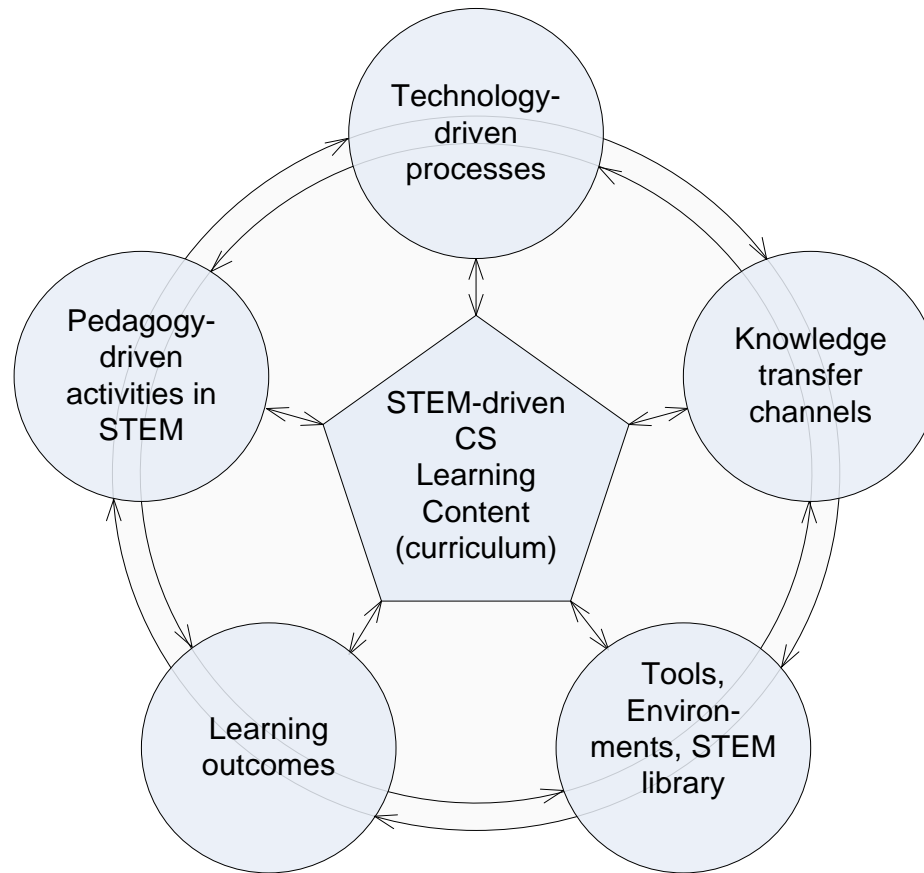
From interview: "...skills like collaboration, creativity, critical thinking, and problem solving are part of any STEAM PBL."

The others include: implementing consequential, side-by-side, inquiry-based, design-based, game-based, project-based learning.

Computational Thinking

- Computational thinking complements critical thinking as a way of reasoning to solve problems, make decisions and interact with our world.
- Computational thinking concepts are such as task decomposition, abstractions and generalization of patterns, developing algorithms, data types, data representation, iterative and parallel thinking, conditional logic, debugging and systematic error detection, etc.
- Creativity and computational thinking have some complex relationship, which leads us to deepen our knowledge regarding these associations by using empirical, objective measures for both constructs.
- From the pedagogical perspective, robotics can make STEM courses more alive, since students can build robots by themselves as well as to program them, and can therefore learn directly from them.

A Framework to Implement STEM



A framework to implement STEM-driven conceptual model of the CS curriculum

Bloom's taxonomy

Bloom's taxonomy defines Knowledge and Cognitive Process.

Knowledge process depends on:

- Factual knowledge,
- Conceptual knowledge,
- Procedural knowledge,
- Metacognitive knowledge.

The Cognitive Processes' Dimension Based on Bloom's Taxonomy

	Category	Cognitive processes
A lower order thinking skills	Remembering – retrieving relevant knowledge from long-term memory.	Recognizing Recalling
	Understanding – determining the meaning of instructional messages, including oral, written, and graphic communication.	Interpreting Exemplifying Classifying Summarizing Inferring Comparing Explaining
	Applying – carrying out or using a procedure in a given situation.	Executing Implementing
An upper order thinking skills	Analyzing – breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose.	Differentiating Organizing Attributing
	Evaluating – making a judgement based on criteria and standards.	Checking Critiquing
	Creating – putting elements together to form a novel, coherent whole or make an original product.	Generating Planning Producing

Computational Thinking Skills

Skill	Explanation
Abstraction	It is the process while simplifying from the concrete (something complicated) to the general as solutions are developed (by leaving out irrelevant details, finding the relevant patterns, and separating ideas from tangible details).
Decomposition	It is the process of breaking down problems into smaller parts that may be more easily solved.
Generalization/ Pattern recognition	It is transferring a problem-solving process to a wide variety of problems and allows to expand an existing solution in a given problem to cover more cases.
Data representation	It is any sequence of one or more symbols given meaning by specific act(s) of interpretation. It is something more fundamental than an algorithm.
Algorithm	It is a practice of writing step-by-step specific and explicit instructions for carrying out a process.

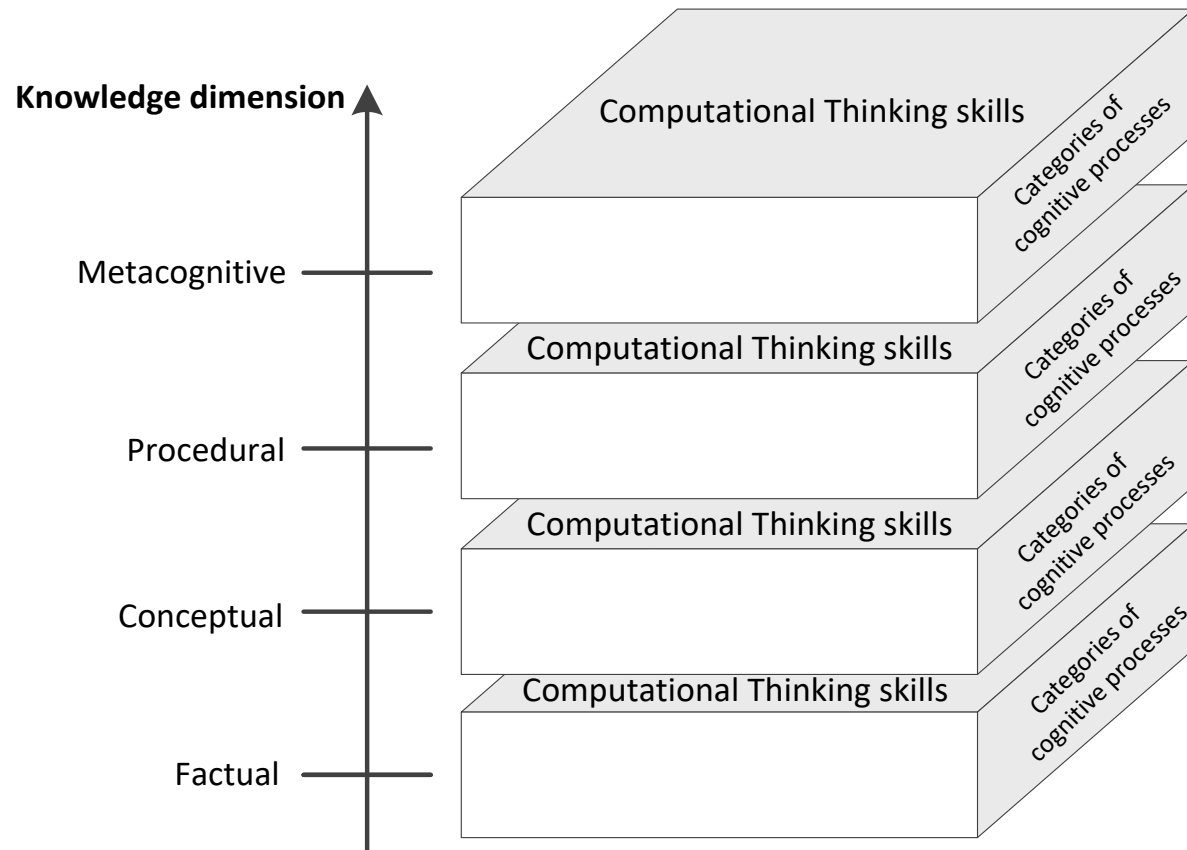
What Is Algorithmic Thinking?

An Algorithm is a method to solve a problem that consists of exactly defined instructions.

Abilities that are connected to constructing and understanding algorithms:

- the ability to analyze given problems;
- the ability to specify a problem precisely;
- the ability to find the basic actions that are adequate to the given problem;
- the ability to construct a correct algorithm to a given problem using the basic actions;
- the ability to think about all possible special and normal cases of a problem;
- the ability to improve the efficiency of an algorithm.

Connection between CT Skills, Knowledge Dimensions and Categories of Cognitive Processes



Suggested Topics for R-Learning (1)

Subjects	Topic / problems	Examples	Comments
Natural sciences	Pollution measurement at classes	Robot measure carbon dioxide amount in class	
Natural sciences / physical education	Heart rate measurement	Robot measure heart rate of every schoolchildren	
Foreign languages	Engagement into foreign language learning process	Robot listen to he commands and go to right or left, forward, back (listen to the commands)	Speech recognition
	Vocabulary enhancement	Robot announces the sensor results, or tells about the environment in which it moves	Speech synthesis

Suggested Topics for R-Learning (2)

Subject	Topic / problems	Examples	Comments
Mathematics	Abstract thinking development / Understanding addition and subtraction	Robot gather or carry out balls and shows main math actions	
	Abstract thinking development / Understanding fractions	Robot divides the wooden fruit into certain parts	
Art	Maintaining symmetry	Robot draw mandalas	Line following accuracy calculation
Physics	Main physics concepts explanation	Robot measure resistance of fruit / Measurement of air temperature change	

Training Framework

**Need analysis,
requirements,
participants
capabilities**

Learners profile
Learning space –
online

Training objectives

Online learning
space
Technology options
Repository
usages....

**Curriculum
creation
(prototype
creation)**

- Problem solving,
- creative Thinking,
- Critical thinking,
- Collaborative learning,
- Making and tinkering

**Training
implementation**

Motivation
Engagement
Delivery

**Training
Evaluation**

Tools for the Online Platform Building (1)

The screenshot shows the H5P website interface. At the top, there is a navigation bar with the H5P logo on the left and a search bar on the right. Below the navigation bar, there is a dark purple banner with the text "We will soon integrate an OER Hub in the H5P Authoring tool!" and a "Learn more" button. The main content area is titled "Examples and Downloads" and contains text about creating interactive content and integrating H5P with various platforms. A "Featured" section is visible at the bottom of the page.

h5p.org/content-types-and-applications

Search h5p.org

Examples & downloads Documentation Goals & roadmap Forum Log in Create free account

We will soon integrate an OER Hub in the H5P Authoring tool!

Learn more

Examples and Downloads

H5P makes it easy to create interactive content by providing a range of content types for various needs. Preview and explore these content types below.

You can create interactive content by adding the H5P plugin to your [WordPress](#), [Moodle](#) or [Drupal](#) site, or integrate it via LTI with [Canvas](#), [Brightspace](#), [Blackboard](#) and [many other VLEs](#) that supports LTI integration.

Check out the [author guide](#) to get started.

Featured

Tools for the Online Platform Building (2)



Accordion

Create vertically stacked expandable items



Agamotto

Create a sequence of images that gradually



Arithmetic Quiz

Create time-based arithmetic quizzes



Audio Recorder

Create an audio recording



Chart

Quickly generate bar and pie charts



Collage

Create a collage of multiple images



Column

Column layout for H5P Content



Dialog Cards

Create text-based turning cards



Dictation

Create a dictation with instant feedback



Documentation Tool

Create a form wizard with text export



Drag and Drop

Create drag and drop tasks with images



Drag the Words

Create text-based drag and drop tasks



Essay

Create essay with instant feedback



Fill in the Blanks

Create a task with missing words in a text



Find Multiple Hotspots...

Create many hotspots for users to find



Find the Hotspot

Create image hotspot for users to find



Find the words

Grid word search game



Flashcards

Create stylish and modern flashcards



Guess the Answer

Create an image with a question and answer



Iframe Embedder

Embed from a url or a set of files

Comparison Between Micro and Macro Learning

		Macrolearning	Microlearning
1	Learning context	formal learning	informal learning
2	Time spent	several hours	a few seconds up to about 15 minutes
3	Content type	learning modules, comprising and structuring a broader range of ideas or topics and combining learning objects	microcontent as small chunks of information, focusing on a single definable idea or topic
4	Content creation	content created by subject matter experts, usually with authoring tools	content co-created by learners with Web 2.0 and rapid e-learning tools
5	Content aggregation and fragmentation	learning objects usually need to be combined with other learning objects to enable full understanding; content can be easily split for re-use and restructuring	microcontent units are self-contained as they can be understood without any additional information; microcontent cannot be divided into smaller pieces without the loss of meaning
6	Content retrieval	courses or topics retrievable through a unique URL, however single learning objects are not addressable	microcontent has a unique URL (permalink), which make even small chunks of information retrievable
7	Structure of the learning cycle	hierarchic, sequential, pre-planned structures consisting of a number of units or lessons, each combining a number of learning objects, such as texts, images, audio, video	dynamic, flexible structures created by learners in the process of learning through syndication, aggregation and modification, based on such data as social tags and bookmarks
8	Target group	learners aiming at gaining an insight into topics defined by domain experts	learners aiming at exploring concepts or solving practical problems
9	Learner's role	learners as consumers of content, attempting to build mental structures similar to those of experts	learners as prosumers of content, building own mental structures through exploration and social interaction
10	Learner participation	focuses on learner-content interactions	focuses on social interactions between learners

Problematic Questions

How will we differentiate the curriculum for different classes?

If we reject robotic and algorithmic thinking, will we reach the purposes of the project?

Do all the K12 schools have internet connections?

According Interview Analysis (Case of Turkey):

„Our school is a village school. Internet connection is required at first.“;

Another problem motivation:

„Only two teachers out of 80 are aware of the fact that STEM is essential for our education. That’s why there are no exact goals for STEM teaching at my school unfortunately.“

What approach we will use for problems solving independent from a specific programming language?

What is our approach to technical infrastructure problems?

Thank you for your attention 😊