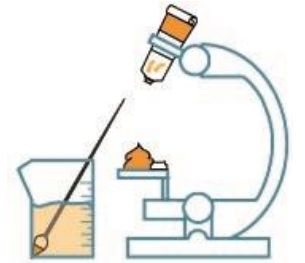# Competence development of STE(A)M educators through online tools and communities
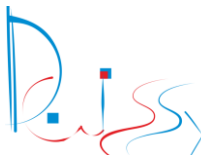## *
project overview

Prof. Achilles Kameas

Project coordinator

DAISSy research group

Hellenic Open University
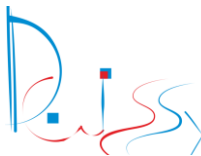
Computer Technology Institute & Press "Diophantus"

Erasmus+/KA3/Forward Looking Cooperation Projects in fields of Education and Training

Aims

- Contribute to innovative and cross-disciplinary approaches in implementing STE(A)M education by revising and strengthening the professional profile of the teaching profession

- Create a solid interdisciplinary base for developing STE(A)M related competences

- Provide a complete framework that integrates all aspects of teaching STE(A)M

Partnership

- INSTITOUTO TECHNOLOGIAS YPOLOGISTON KAI EKDOSEON DIOFANTOS (EL)
  - Coordinator, competence framework, platform and MOOC, quality assurance
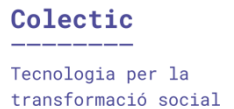- ALL DIGITAL AISBL (BE)
  - Dissemination and exploitation
- STATI GENERALI DELL INNOVAZIONE DI PROMOZIONE SOCIALE (IT)
  - Evaluation, piloting
- HELLIWOOD MEDIA & EDUCATION IM FJS E.V. (DE)
  - Community management, education framework, piloting
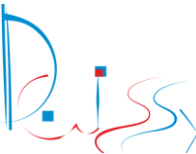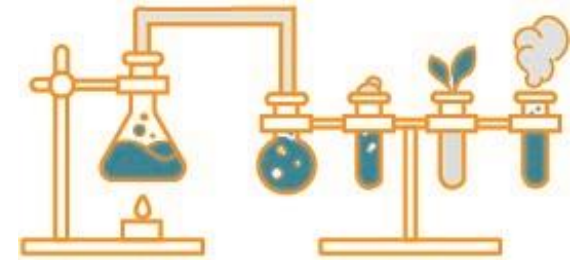- FUNDATIA EOS - EDUCATING FOR AN OPEN SOCIETY ROMANIA (RO)
  - Training curricula, evaluation piloting
- COLECTIC SCCL (ES)
  - Community management, evaluation, piloting
- REGIONAL DIRECTORATE OF PRIMARY AND SECONDARY EDUCATION OF WESTERN GREECE (EL)
 - Practices and policies, educators' needs, piloting

Target groups

- Teachers and trainers, who are interested in practicing STE(A)M education

- Education and training organizations

- Researchers in educational methods and techniques

- Educational authorities and policy makers

- Other stakeholders (e.g. career consultants)
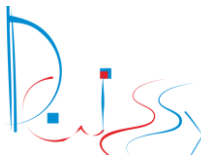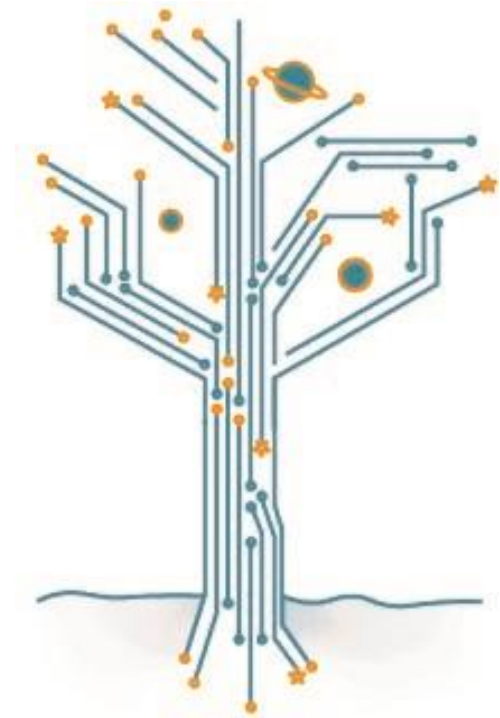
What is STEM / STEAM education?

- Integrated STEM education is "an effort to combine some or all of the four disciplines of science, technology, engineering, and mathematics into one class, unit, or lesson that is based on connections between the subjects and real-world problems" (Moore et al., 2014)

- STE(A)M is seen as a practice that recognizes the real-world role of the arts, it is not merely equivalent to arts integration (Huser et al., 2020)

- The "A" may be interpreted as Arts Education, Arts as any non-STEM discipline, Arts as a synonym for project-based learning, problem-based learning, technology-based learning, or making.

- The main aims and objectives of the STE(A)M education approach are (Papadouris, 2021):
    - to prepare active and functioning citizens in a scientific and technological based society.
    - to offer education based on activities focusing on designing, experiential learning and problem solving.
    - to support the development of transversal, soft skills such as critical thinking and communication.
    - to strengthen students' personal and social abilities in order to familiarize students with the new demands of the labour field and create better opportunities with their futures in mind.

- STEAM encourages the blending of knowledge that is required in the real world and natural curiosity (Definition by the Peer Learning Activity on STEAM education, Vienna, March 2020).
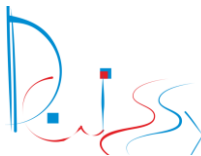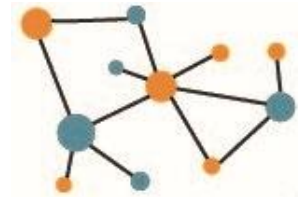
The STEAMonEdu approach

- Aspect 1: community
  - Teachers and educators are given a central role as members of an online community

- Aspect 2: support
  - Identification of the roles and competences involved in applying STE(A)M as an educational practice and development of tools

- Aspect 3: development
 - Professional development of teachers and educators via MOOC and blended learning course
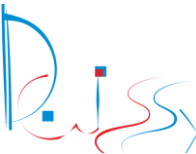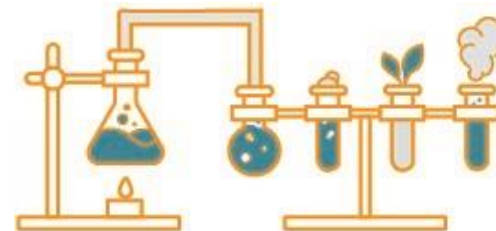
Important outcomes

- Competence-based tools
  - STE(A)M competence framework
  - STE(A)M educator profile (based on ESCO)
  - STE(A)M readiness SAT (based on SELFIE)
- Integrated STE(A)M education framework
  - STE(A)M educators community
  - Online collaborative platform
  - STE(A)M education framework
  - Blended course including a MOOC based on the profile of STE(A)M educator, supplemented by online and classroom activities
- Policy instruments
  - Guide of STE(A)M educational practices and policies
  - STE(A)M policy influencer toolkit
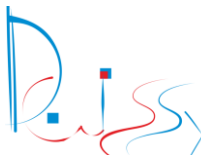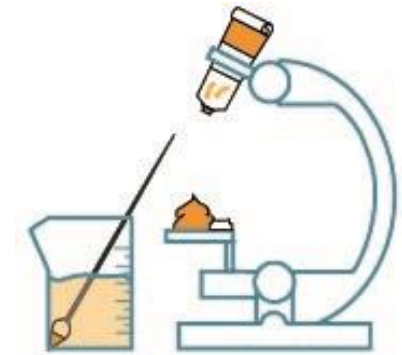
STE(A)M education framework

- The educator's position

- Competences
  - Educator
  - Student

- Instructional meta-methodology

- OER specifications

- Body of knowledge
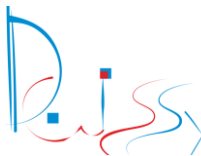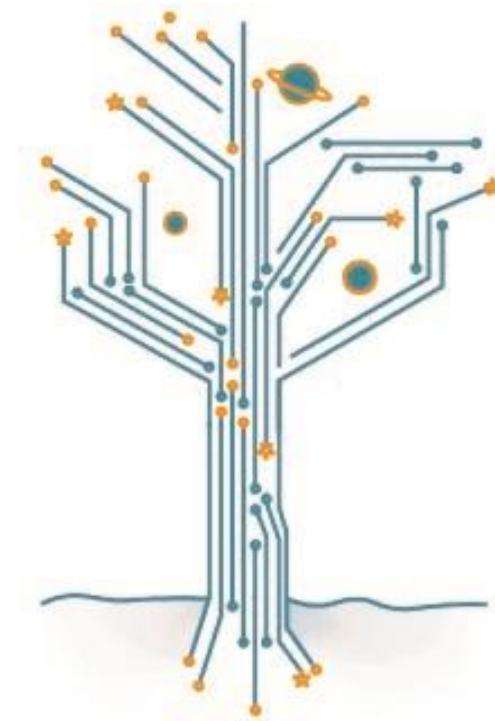
Guide of STE(A)M education practices

- More than 60 STE(A)M education practices that have been submitted to our platform have been evaluated using a set of principles and criteria

- Principles
    - Integrated Content
    - Real-word integration
    - STEAM and Beyond
    - Inclusive STEAM education
    - Next Generation/21st Century Skills
    - Project-Based/Problem-Based Learning
    - Authentic Assessment
    - Integrated Learning System
    - Technology-Enabled Learning
    - Learning Technology vs. Teaching Technology
    - Emphasis on Applied Technology
    - Teacher as Facilitator
    - Collaboration
    - Open-Ended Learning
    - Supported

- Currently 11 of them have been labelled as "best practices" and have been included in the Guide

- Criteria (the STE(A)M practice…)
    - Is interdisciplinary and connects numerous subjects?
    - Represents the rich relations between Science, Technology, Engineering, Arts and Mathematics?
    - Supports a complex growth of the learner including intellectual, emotional, and social development?
    - Emphasizes the ethical component of STEAM?
    - Contributes to competence development (includes knowledge, skills, attitudes) and is balanced (between theory and practice)?
    - Is not simply the sum of many components, but holistic in including their various interrelations?
    - Is a social activity with human interaction and emotional involvement?
    - Is learner-centred (aiming to impact individuals and the society)?
    - Is inclusive, gender balanced and values diversity?
    - Etc.
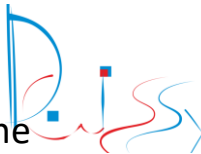
STE(A)M competence framework

- **5 perspectives**
  - Educator as teacher-trainer-tutor / implementing the educational procedure
  - Educator as learning designer and creator / designing and producing outcomes
  - Educator as orchestrator and manager / coordinating procedures and outcomes
  - Educator as community member / interacting with the environment
  - Educator as professional / developing and applying competences

- **16 competence areas**
  - E.g. Pedagogy, Content knowledge, Learner empowerment, Course / curriculum / activity design, Content design and development, Community building, etc

- **44 competences**

- Integrates digital skills and transferrable skills

Online community and platform

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

Next stages of the project

- STE(A)M educator competence-based profile(s) (Spring 2021)

- Delivery of MOOC (Spring 2021)

- Delivery of blended course (Autumn 2021)

- STE(A)M readiness SAT for organizations and educators (Autumn 2021)

- Participation to the online community is open!

- Continuous elicitation of STE(A)M education practices and policies
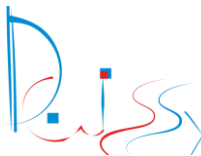
Conference on STE(A)M educators & education

7-9 May, 2021

Addressed to scientists, teachers and educators of all levels engaged or interested in applying STE(A)M education, researchers and postgraduate students, education executives, providers of vocational education and training but also to any individual interested in being informed of the latest scientific developments, experiences and the results of the implementation of the STE(A)M educational approach.

Paper / practice submission deadline:
11 April

Join us!

More info about the STEAMonEdu project at:

- Web: https://steamonedu.eu
- Email: SteamOnEdu@cti.gr
- FB: #SteamOnEdu
- Tw: @SteamOnEdu

More info about DAISSy research group at:

- Web: http://daissy.eap.gr
- Email: info@daissy.eap.gr
- FB: DAISSyResearchGroup
- Twitter: daissy_research
- Instagram: @daissy_researchgroup
- LinkedIn: daissyresearchgroup
- YouTube: DAISSy Research Group