



PROJECT TITLE:	Mathematics of the Future: Understanding and	
	Application of Mathematics with the help of Technology, FutureMath	
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Intellectual Output 1:	Analysis report on state of art in
	using technologies to support
	teaching in Mathematics after
	Covid-19 crisis

Result: STEAM intervention guidelines or Guides for STEAM learning in blended environment

Prepared by UNS







Guides for STEAM learning in blended environment

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Introduction

STEAM intervention guidelines or Guides for STEAM learning in blended environment are prepared based on Collection of good practices and current STEAM methods before Covid-19 crisis and Collection of distance learning practice during the Covid-19 crisis.

STEAM educational framework was created by G. Yakman in her research (2008) and presented in Figure 1.

(STEAM Pyramid2018 with two titles copy (steamedu.com))







This diagram for the education of the formal fields of science, technology, engineering, mathematics and the arts is adjusted with Bloom taxonomy.

According to Bloom's taxonomy there are 6 levels of cognitive process that can be used to structure the learning objectives, lessons, and assessments of the teaching course (Figure 2).





STEAM intervention guides are prepared, as the connection between STEAM educational framework and Bloom taxonomy. In the following section we present the guides for creating STEAM lessons in according STEAM framework and Bloom taxonomy in blended learning environment.

Guides for STEAM learning in blended environment for teachers

The next schema, Figure 3., illustrates teaching and learning process of STEAM contents in STEAM sense by using Bloom's taxonomy appropriate for face to face and on line, in computer environment. The teachers should prepare their lessons, teaching materials following the steps in this schema. The teacher has to:

- 1. pose the problem in a way that the students can remember (recognize and recall facts) and understand what the facts means;
- 2. plan details appropriate for the posed problem and expected solutions;





- 3. enable Implementation in a way that students can apply the facts, rules, concepts and ideas;
- 4. enable Analysis in a way that students can break down the information;
- 5. help students to create Solution, to judge the values of information, to combine the parts and to make new whole.



The posed problems, from STEAM specific disciplines with STEAM contents should be prepared interdisciplinary, integrative for lifelong learning.

The teacher need to prepare plan of learning in details, adapt teaching material to the technology available in the current situation taking into account students' **constructivist way** of thinking. The details of teacher's plans should depend of the posed problem.





The teachers should plan the appropriate methodology:

- 1. mathematical modeling process (Starting from real life, sciences, or engineering situations and problems to obtain corresponding mathematical model, to work mathematically and to interpreted the obtain results);
- 2. students work in small group or individual (2,3,4,5 members small group taking care about forming group process);
- 3. project based learning;
- 4. problem based learning.

During the implementation, analysis and solution process the teacher need to enable inquire based, making meaning instructions and equitable assessment.

STEAM learning process is the integrity 21st century skills and therefore each phase in this process must be conducted in computer environment and adjusted for blended learning.

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