Arts and STEM for social inclusion

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WHAT DOES MEAN "INCLUSION"?

Inclusion is an environment where everyone has an opportunity to fully participate.

In education, **same opportunity**, **no boundaries!**

All students should **feel valued,** be able to **participate** with all members of the group be in a **safe and positive environment**.

AN OVERVIEW ON THE TOPIC

(European Agency for Development in the Special Needs Education "*Profile of inclusive teachers*", 2012)

Four values are linked to the profile of the inclusive teacher:

➢ **Evaluating the diversity of the students**: the difference among students is a resource and a wealth;

➢ **Supporting students**: the teachers must promote high expectations on the students' academic success;

AN OVERVIEW ON THE TOPIC

(European Agency for Development in the Special Needs Education "*Profile of inclusive teachers*", 2012)

➢ **Working with others**: collaboration and teamwork are essential approaches for all teachers;

➢ **Guaranteeing continuous professional updating**: teaching is a learning activity and teachers are responsible for their lifelong learning.

A COMPARISON BETWEEN PAST AND NOW

In the past, the **educational need** was too often **medicalized** and relegated exclusively to **specialized figures**.

So did the **teaching**, **made special**, became an assemblage of **educational strategies** addressed to the specific case.

WHAT IS INCLUSIVE EDUCATION?

The **inclusive education** is the teaching of all, which is declined to **personalization** and **individualization** through **active**, **participatory**, **constructive** and **affective methodologies**.

BE SPECIAL!

This doesn't mean something far from what we intend for "*normality*", but situations requiring **BETTER COMPETENCES** and **RESOURCES.**

INITIAL ASSUMPTIONS

V
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> It is necessary to **VALORIZE** the students.

> It is necessary to **VALORIZE** what the students can do

Meaningfulness
> **Giving meaning** to the work of the students by **contextualizing**.

> Starting from the representations of the pupils, from the acquired knowledge to make new ones meaningful.

Motivate
> Considering both **cognitive** and **motivational aspects**.

> Considering **aspects of learning** and the **subject who learns**.

INCLUSION: PEDAGOGICAL MOTIVATIONS

Integration

➤ It is a **situation**.

➤ It has a **compensatory approach**.

➤ It refers exclusively to the **educational field**.

➤ It intervenes **first** on the **subject** and **then** on the **context**.

➤ It increases a **specialized response**.

Inclusion

➤ It is a **process**.

➤ It refers to the **whole** of the **educational**, **social** and **political** spheres.

➤ It looks at all the **students** (indistinctly/differently) and at all **their potential**.

➤ It intervenes **first** on the **context** and **then** on the **subject**.

➤ It transforms the **specialist response** into **ordinary**.

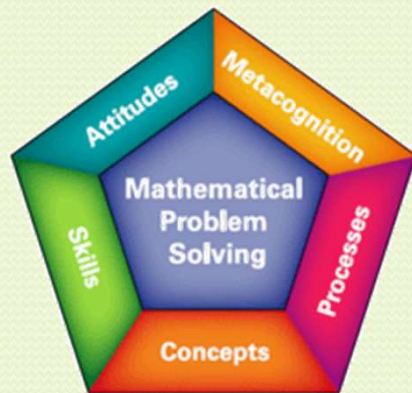# LEARNING IN INCLUSIVE PEDAGOGY
(NOVAK)

Meaningful learning

Through the discovery
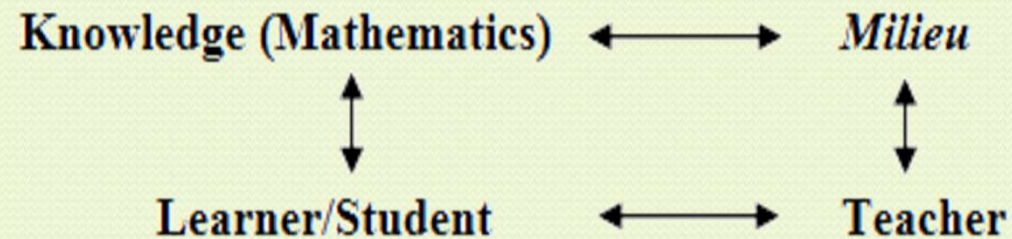
Through the meaning processing

TWO EXPERIENCES

ART as common tool

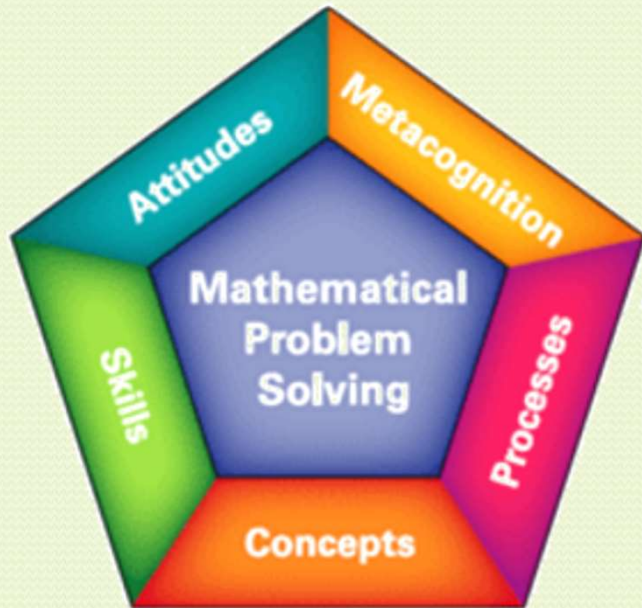From **object manipulation** to the **abstract representation**

G.A. STEM Project - **Enhancing STEM** skills through **arts** and **mini-games**
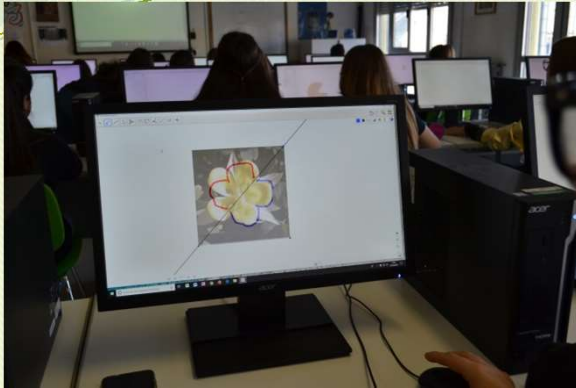
"MILIEU" OF BROUSSEAU

Knowledge (Mathematics) ⟷ *Milieu*

⟷

Learner/Student ⟷ Teacher

The "**milieu**" in the proposed model is identified by the **art**
which is the "**context**" to reach knowledge.
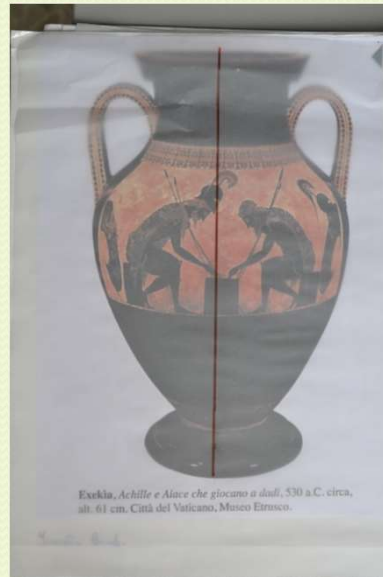
HOW?

Concrete ➤ Pictorial ➤ Abstract

The Singapore's approach is defined as the **Concrete** to **Pictorial** to **Abstract** approach (CPA).

METHOD APPLICATION

1° phase "Concrete": Students will construct specific objects.

2° phase "Pictorial": Students will learn to recognize maths in the art

3° phase "Abstract": Students will create their art work starting from the maths formula studied.

G.A. STEM PROJECT
ENHANCING STEM SKILLS THROUGH ARTS AND MINI-GAMES

Time: 01/10/2018 - 31/03/2021

Erasmus+

2018-1-FI01-KA201-047215

University of Turku

EU-Track

Associazione Pixel

Tallinn University

Rieskalahteen koulu
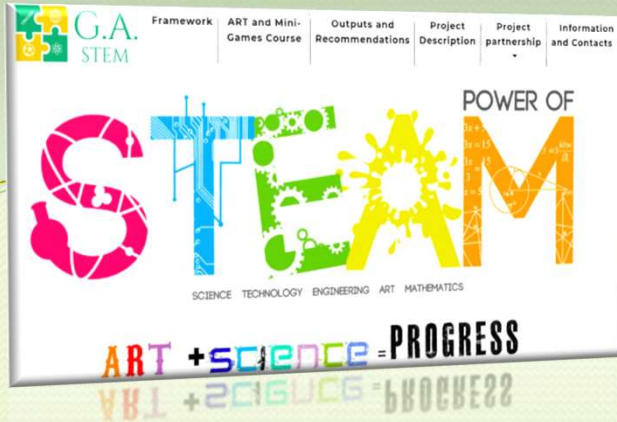
I.C. Maria Montessori

Sint-Lievenscollege

Tamsalu Gymnasium

OBJECTIVES

1. Improving **motivation** in **scientific study** through the use of "**Art-works**".

2. Utilizing the **attractiveness** of the **art** and **technology** (in terms of mini-games design and game assets) to improve **social inclusion**.

3. Supporting **STEM skills** useful for **professional careers** for both teachers and students.

4. Improving the **collaborative attitude** among teachers and schools focusing on the **interdisciplinary** and **multidisciplinary approach**.

5. Discovery of **European Cultural Heritage** constituted of art-works produced in the partner project countries.

FIRST RESULT

An overview on **how to integrate Art** in **STEM education** using **mini-games** and **setting game scenarios**. It describes the criteria used in order to **select the exercises** on **math and science** to be used for the realization of the **study projects** with their **students** during the **piloting phase**.

The target groups are *secondary school teachers* and *13-16 years-old students*.

https://gastem.pixel-online.org/index.php

G.A.
STEM

Enhancing STEM skills through Arts and mini-games

O1 - FRAMEWORK TO INTEGRATE ART IN STEM USING DIGITAL GAMES

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THE EXERCISES SELECTED

Expected results		Learning content (topics, concepts, context and activities)			Art-Work selected
Nucleus of the learning content	Expected results at a curriculum level	Expected results divided into topics	Basic terms (divided into topics)	Context and activities	
Percentage. The Golden Ratio. Area.	• Expressing the division of two numbers or ratio in percentage; • Understanding the concept of a ratio and uses ratio language to describe a ratio relationship between two quantities; • Calculating what percentage one number is of another and explains what the result shows; • Recognizing and representing proportional relationships between quantities; • Identifying the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships; • Solving real-life and mathematical problems involving area.	**Percentage:** • Expressing the division of two numbers to a ratio in percentage; • Calculating what percentage one number is of another and explains what the result shows. **Ratio:** • Recognizing and representing proportional relationships between quantities; • Identifying the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships; • Understanding the concept of a ratio and uses ratio language to describe a ratio relationship between two quantities. **Geometry** • Solving real-life and mathematical problems involving area.	Expressing ratio as a percentage. The Golden Ratio. Area.	1. Solving the tasks, to calculate the perimeter and area of the given geometric shapes; 2. Solving the tasks to find the ratios and percentages; 3. Creating own Modrian Art.	Mondrian Art

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ACTIVITIES

1. Solving the tasks, to **calculate the perimeter** and **area of the given geometric shapes**;

2. Solving the tasks to find the **ratios** and **percentages**;

3. **Creating own Modrian Art**.

1. Expressing **ratio as a percentage**.

2. The **Golden Ratio**. Area
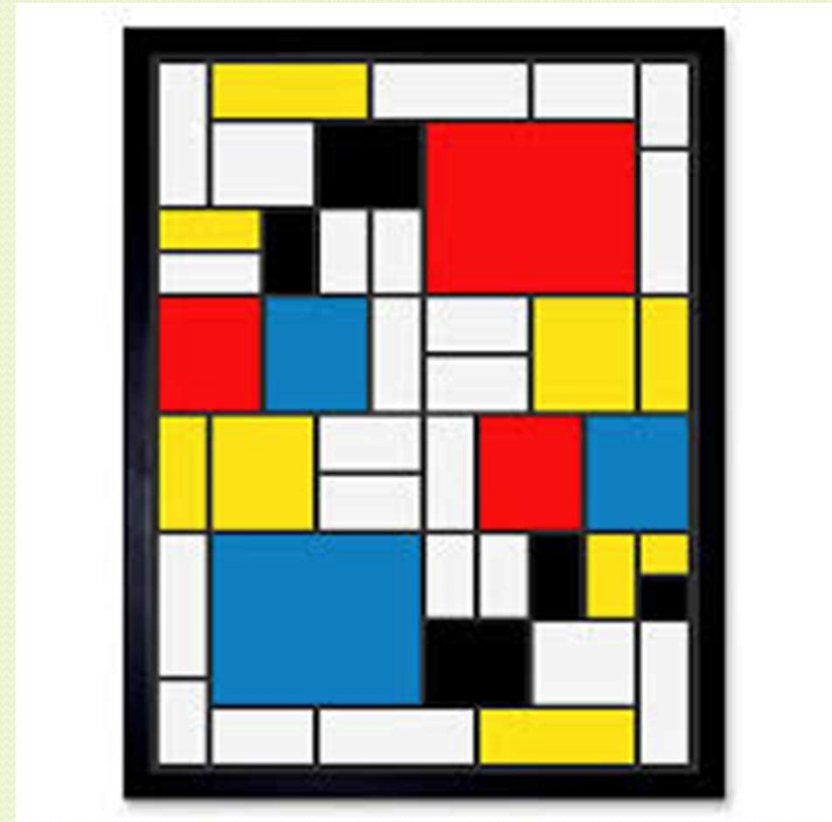
"ART AND MINI GAMES" COURSE

It will be structured into **n. 4 modules** (duration n. **30 hours**), designed on the research report:

1. **Improving STEM skills using the ARTs**;

2. **Combining ARTs and game for STEM**;

3. **Working with game mechanics and game scenarios**;

4. **The piloting phase: how to implement project tools and methodology**.

THIRD PROJECT RESULT

- **Mini-games development and design** will help **student** to become **co-constructor** and **co-creator** of learning outcomes.

February 2020 – March 2021

CONCLUSION

The proposed **methods** and **tools** can favor the **creation** and the **development** of a more **effective learning environment** which benefits both **cognitive** and **emotional** dimensions in students.

They can **reinforce** the **learning process** by increasing the **quality of student performance** based on **problem solving skills** and the **cooperative learning**.

ARTs favors the use of **multiple perspective channels** (visual, auditory, tactile, etc.) and the **use of technology** by increasing learning thanks to the potentiality of **different learning styles**

Thank you for your attention!

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