Acadimia internal training
21 Sept. 2023

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Blended Montessori-Creative Technologies approach for successful inclusion in Multicultural Schools

Sarah Kennedy-Berge, Aleksandra Zarosa – Waterpark Montessori International (Norway)
Maria Berrocal, Eduard Muntaner, Jordi Freixenet, Marta Peracaula – University of Girona (Spain)

WATERPARK MONTESSORI

UdiGital

Universitat de Girona

What will we do in the session?

1) Project Context

2) Montessori principles

3) Creative Technologies

4) Why would Maria Montessori embrace Creative Technologies

5) Teacher Guide and Workshops Sequence

6) Teachers Testimonials

5) Discussion

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MoMTECH

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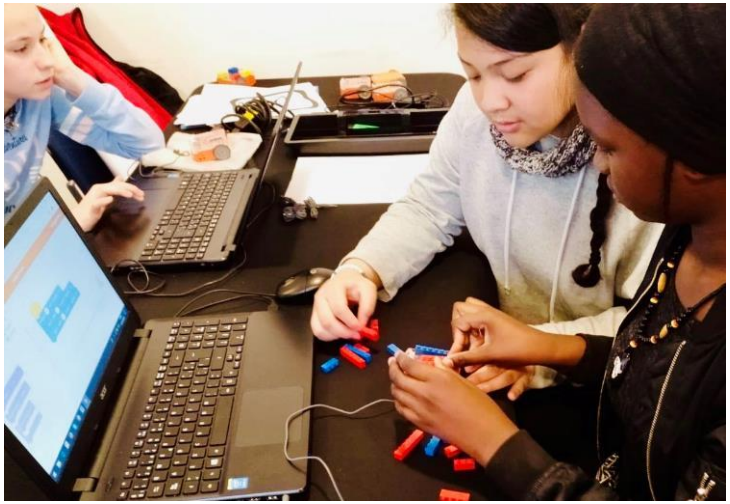
Blended **Montessori Creative Technologies** approach for successful inclusion in Multicultural Schools

montessoritech.eu

Proj Ref: 621461-EPP-1-2020-1-ES-EPPKA3-IPI-SOC-IN

Universitat de Girona · WATERPARK MONTESSORI · ELORIS S.A. · Action · MONTESSORI PALAU GIRONA · Zaffiria



UdiGital

Universitat de Girona

CREATIVE LEARNING, STEAM AND SOCIAL CHANGE

The **UdiGitalEdu** group designs learning experiences for children and young people to help them become more creative, critical and develop positive values. The group develops projects at a local, national and international level, and focuses on disadvantaged groups and children from vulnerable families and communities.

Maria Antonia Canals

Mathematician, pedagogist, teacher and teacher of teachers

Active learning of mathematics. Manipulative, self-created materials.
GAMAR lab

Maria Antonia Canals

Mathematician, pedagogist, teacher and teacher of teachers

Dublin 2018: Learning about Montessori Principles with Waterpark Montessori in SEDIN project

If Maria Montessori were alive today, how could she incorporate technology in the classroom while staying true to her educational approach?

We have tried to answer this question practically through real activities, designed by experts in both fields & participation of teachers.

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Partners:

DESIGNERS & IMPLEMENTATORS

CREATIVE TECHNOLOGY EXPERTS

Universitat de Girona

PROJECT COORDINATOR

GIRONA (SPAIN)

Zaffiria

BOLOGNA (ITALY)

MONTESSORI EXPERTS

MP MONTESSORI PALAU GIRONA

GIRONA (SPAIN)

WATERPARK WM MONTESSORI

CORK (IRELAND)

DESIGNERS & IMPLEMENTATORS

Action

ATHENS (GREECE)

ELORIS SA

LESVOS (GREECE)

Center for creative training

SOFIA (BULGARIA)

Liceul tehnologic "Constantin Ianculescu"

CRAIOVA (ROMANIA)

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The MonTech learning proposal stands on two pillars:

1- Montessori learning principles

2- Creative Technologies: (Technologies for creating and learning)

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1- Montessori learning principles

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1- Montessori learning principles

Respect for the Child

- Allow for independence
- Freedom within limits
- Prepared environment to support psychological, social, and physical development of the individual
- Control of error

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1- Montessori learning principles

Intrinsic Motivation

- Activate the imagination
- Wonder and curiosity
- Exploration
- Real-life, relevant experiences
- Collaborative project work

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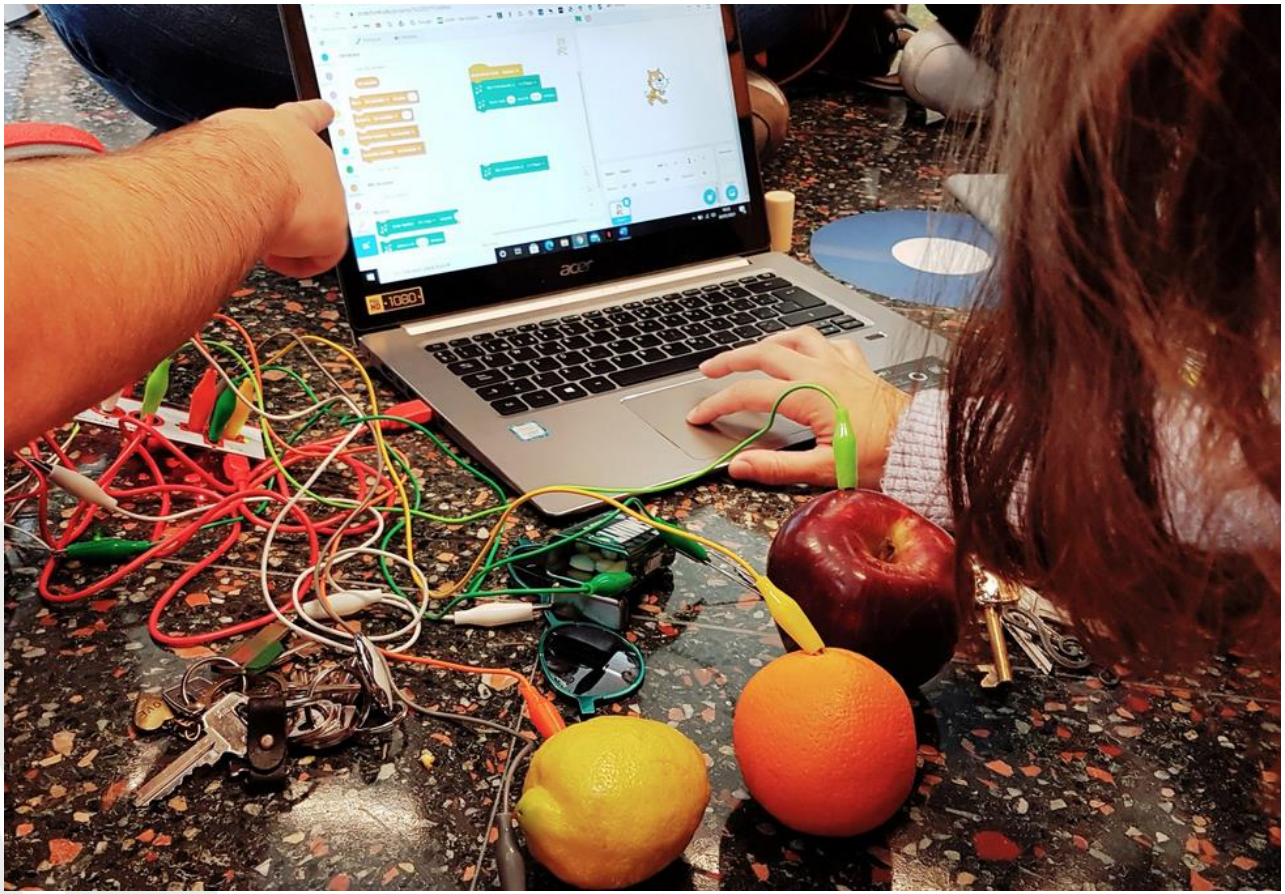
2- Creative Technologies:



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2- Creative Technologies

Technology as a medium of creative expression and learning.

Creative technologies relate to:

- Constructionism,
- Maker Education and Tinkering,
- Computational Thinking,
- Creative Computing,
- STEAM Education

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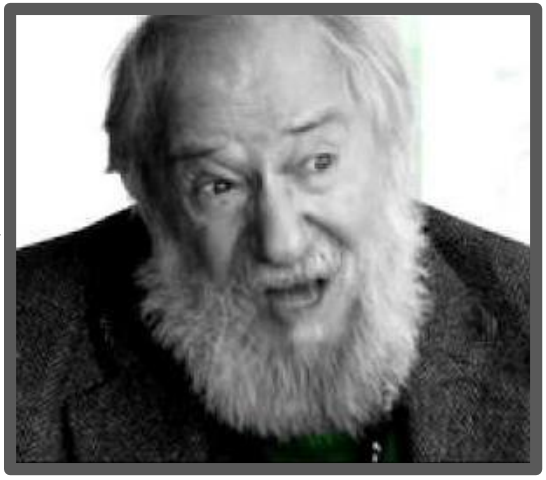
Constructionism

J. Piaget
1896-1980

S. Papert
(1928-2016)



Constructivism

Knowledge acquisition is a process of continuous self-construction. The child builds his/her knowledge with what is meaningful to him/her, making a process of assimilation of what is new with respect to what he/she already knows.

Learning occurs when a new experience makes connections to existing knowledge

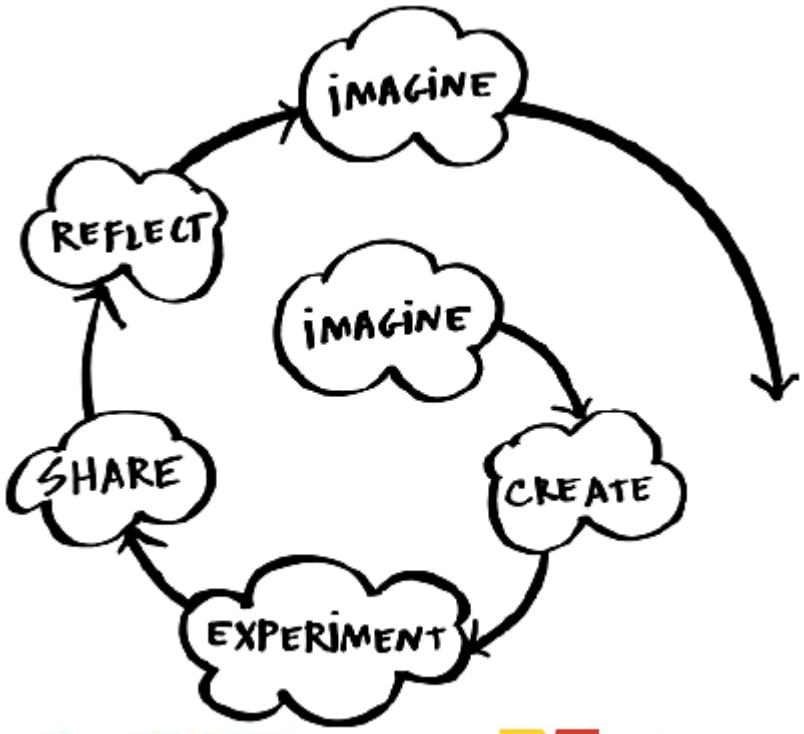
Constructionism

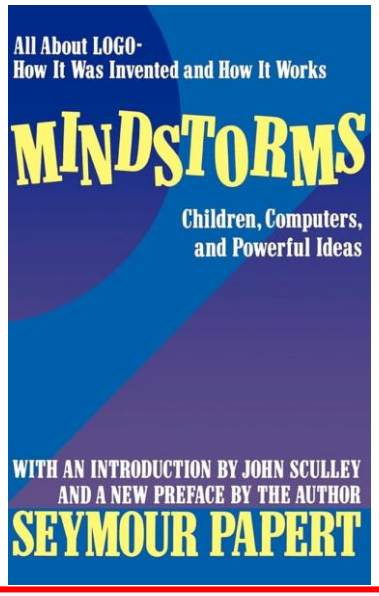
Learning is enhanced in contexts where the learner is consciously engaged in constructing a product (artifact) that can be converted in sharable things or public entities and that is meaningful to him/her
(robot, poem, sandcastle, theory of the Universe..)

Constructionism

S. Papert

M. Resnick





Computer as an object to think with

All I Really Need to Know (About Creative Thinking)
I Learned (By Studying How Children Learn) in Kindergarten*

Mitchel Resnick
MIT Media Lab
mres@media.mit.edu

Presented at Creativity & Cognition conference, June 2007

Based on Robert Fulghum text

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Maker education:

Encourages children to take control of their own learning while they make/build/create/invent within workshops and makerspaces

Promotes informal, cooperative and networking learning

Promotes connections between disciplines traditionally disconnected:

art & design, robotics, ..

Relates to the Maker Movement based on the human desire to make things:

- DIY (Do it yourself)
- DIWO (Do it with others)
- + adding the power of digital and internet

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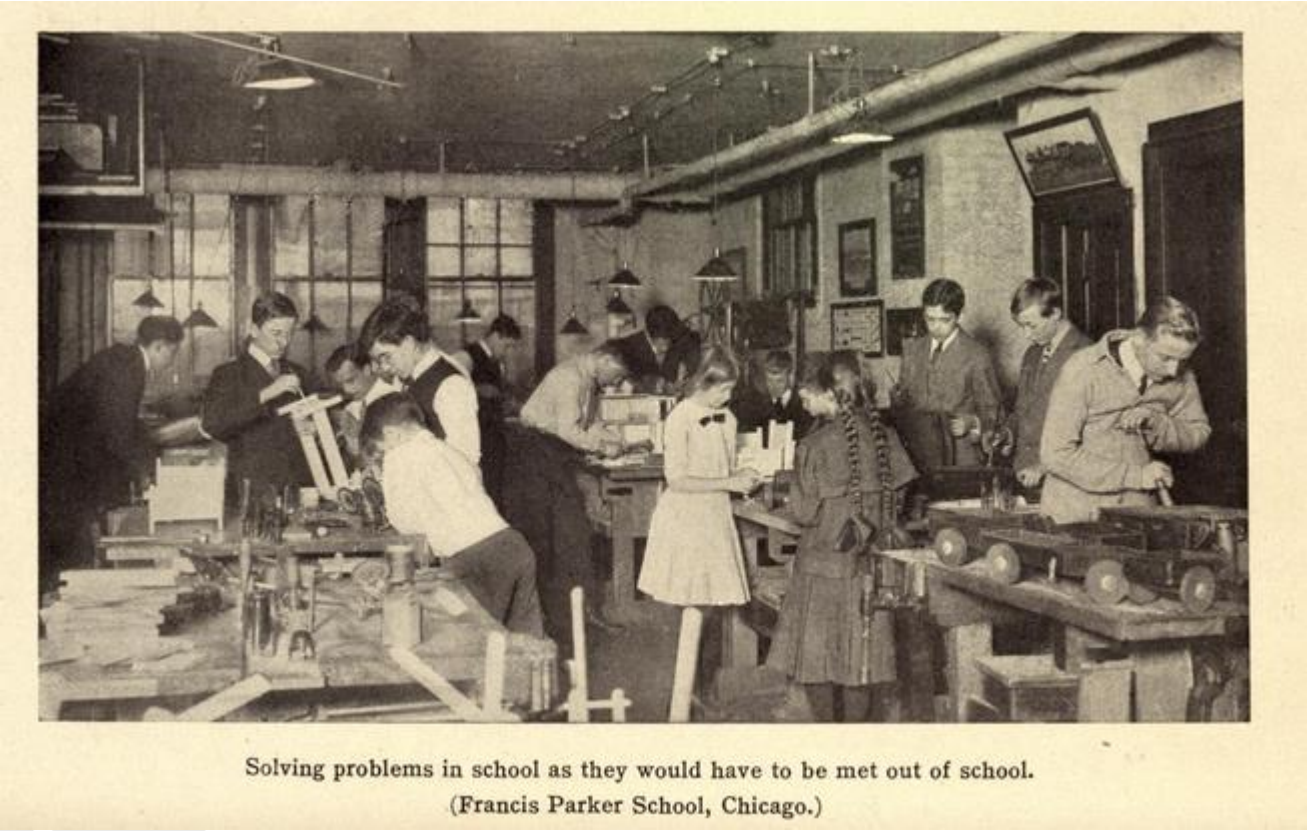
Maker education:



Solving problems in school as they would have to be met out of school.
(Francis Parker School, Chicago.)

J. Dewey, Schools of tomorrow, 1915

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Maker education:

Maker Education principles:

(Sylvia Martinez & Gary Stager, based on S. Papert ideas)

1. Learning by Doing
2. Learning to Learn
3. You can’t get it right without getting it wrong
4. Taking time
5. Objects to think with
6. Hard fun
7. Do on ourselves what we do on our students

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Computational Thinking:

Viewpoint | Jeannette M. Wing

Computational Thinking

It represents a universally applicable attitude and skill set everyone, not just computer scientists, would be eager to learn and use.

Computational thinking builds on the power and limits of computing processes, whether they are executed by a human or by a machine. Computational methods and models give us the courage to solve problems and design systems that no one of us would be capable of tackling alone. Computational thinking confronts the riddle of machine intelligence: What can humans do better than computers? and What can computers do better than humans? Most fundamentally it addresses the question: What is computable? Today, we know only parts of the answers to such questions.

Computational thinking is a fundamental skill for everyone, not just for computer scientists. To reading, writing, and arithmetic, we should add computational thinking to every child's analytical ability. Just as the printing press facilitated the spread of the three Rs, what is appropriately incestuous about this vision is that computing and computers facilitate the spread of computational thinking.

Computational thinking involves solving problems, designing systems, and understanding human behavior, by drawing on the concepts fundamental to computer science. Computational thinking includes a range of mental tools that reflect the cisely. Stating the difficulty of a problem accounts for the underlying power of the machine—the computing device that will run the solution. We must consider the machine's instruction set, its resource constraints, and its operating environment.

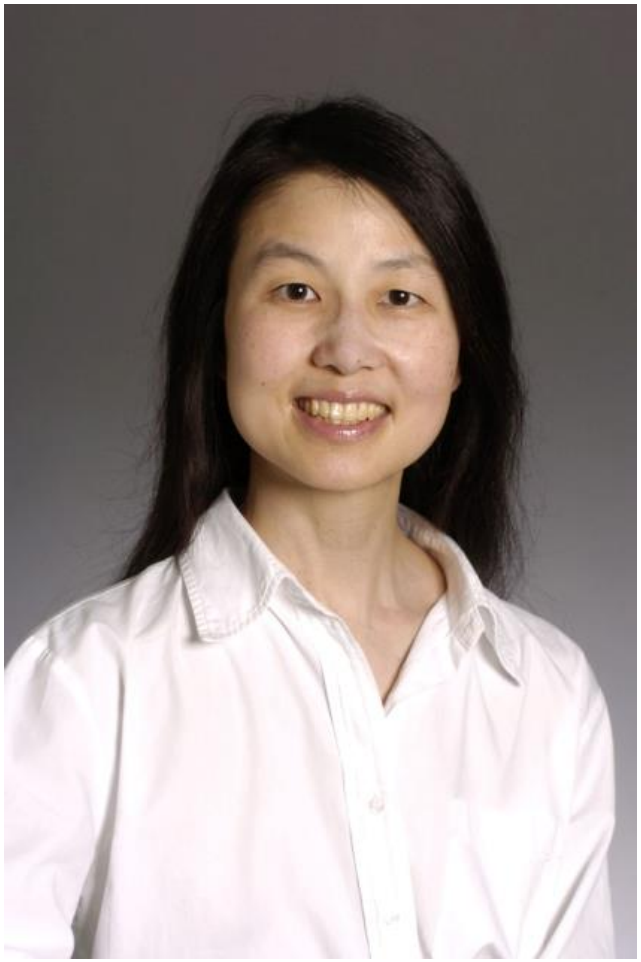
In solving a problem efficiently, we might further ask whether an approximate solution is good enough, whether we can use randomization to our advantage, and whether false positives or false negatives are allowed. Computational thinking is reformulating a seemingly difficult problem into one we know how to solve, perhaps by reduction, embedding, transformation, or simulation.

Computational thinking is thinking recursively. It is parallel processing. It is interpreting code as data and data as code. It is type checking as the generalization of dimensional analysis. It is recognizing both the virtues and the dangers of aliasing, or giving someone or something more than one name. It is recognizing both the cost and power of indirect addressing and procedure call. It is judging a program not just for correctness and efficiency but for aesthetics, and a system's design for simplicity and elegance.

Computational thinking is using abstraction and decomposition when attacking a large complex task or designing a large complex system. It is separation of concerns. It is choosing an appropriate representation for a problem or modeling the relevant aspects

COMMUNICATIONS OF THE ACM March 2006/Vol. 49, No. 3

Jeannette Wing, 2006



Computational Thinking:

"Computational thinking involves solving problems, designing systems and understanding human behaviour by drawing on the concepts fundamental to computer science."
(Wing, 2006: p 33).

RELATES TO MONTESSORI APPROACH

- Divide complex problems into smaller size modules.
- Sequence long and complex processes in "steps".
- Organize and analyze data recognizing logical patterns.
- Start from specific cases to arrive at abstract and generalizable situations.
- Create elegant and ingenuos solutions
- Discover ways to automate solutions –algorithms-
- Evaluate the validity of solutions

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Creative computing:

Using and learning with tools that allows to create construct physical and digital artifacts.

Many examples in the MonTech guide

STEAM education:

Education methodologies that use interdisciplinary approaches to blend the learning of Science, Engineering, Arts and Mathematics and do so taking advantage of Technology.

Connects with project base learning, real world problems, and transversal learning between disciplines

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Learning with Creative Technologies using a Montessori Approach

Why would Maria Montessori embrace Creative Technologies?

Using creative technologies for learning **could** promote the following Montessori principles:

- Respect for the child
- Intrinsic motivation
- Prepared environment
- Auto-education
- Control of error
- Child independence
- Freedom within limits
- Educating the whole child

(intellectual, emotional and social growth)

Generated with Midjourney 5.2

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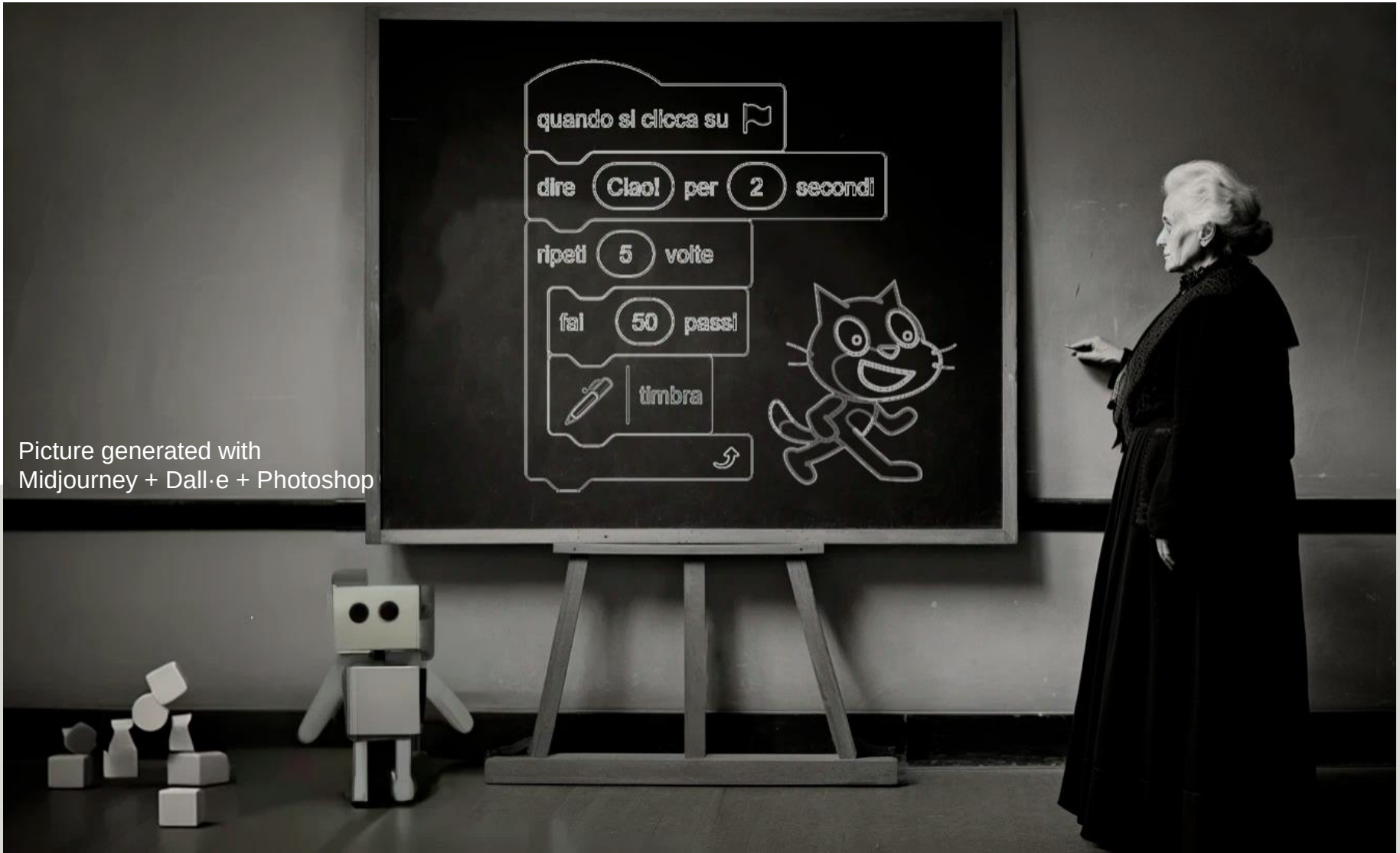
Why Would Maria Montessori be a Scratcher?



Picture generated with
Midjourney + Dall·e + Photoshop

Why Would Maria Montessori be a Scratcher?

Maria Montessori believed that music literacy was an element of culture that **children ought to learn**. She wanted us to **teach all children** to read music. Music performance should **not be just for talented** people and artists. Music **belongs to us all** and should be used as a **creative medium**.

Healy Walls (2008). At the Heart of Montessori II: Core Principles in Action

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Why Would Maria Montessori be a Scratcher?

Mitch Resnick believes that coding is an element of culture that **children ought to learn**. He wants us to **teach** coding to **all children**. Coding should **not be just for talented** people and engineers. Coding **belongs to us all** and should be used as a **creative medium**.

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Just as the Montessori methodology was originally designed to help poor children from disadvantaged backgrounds, the MonTech project and its guide are designed to help especially multicultural schools.

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MonTech Timeline

2021

1) Theoretical framework
2) Listen to the multicultural school teachers
3) 1st version of the MonTech Guide (not public)

Jan 2022 to Sept 2022

4) Training the Trainers (Girona + time to test + Athens)
5) 2nd version of the MonTech Guide (public)

Sept 2022 to Dec 2023

5) Teacher Training (350/500 from Romania, Spain, Greece, Italy, Bulgaria, Norway)
6) Implementation in multicultural schools
7) Quality Assurance & Evaluation, Dissemination, Sustainability

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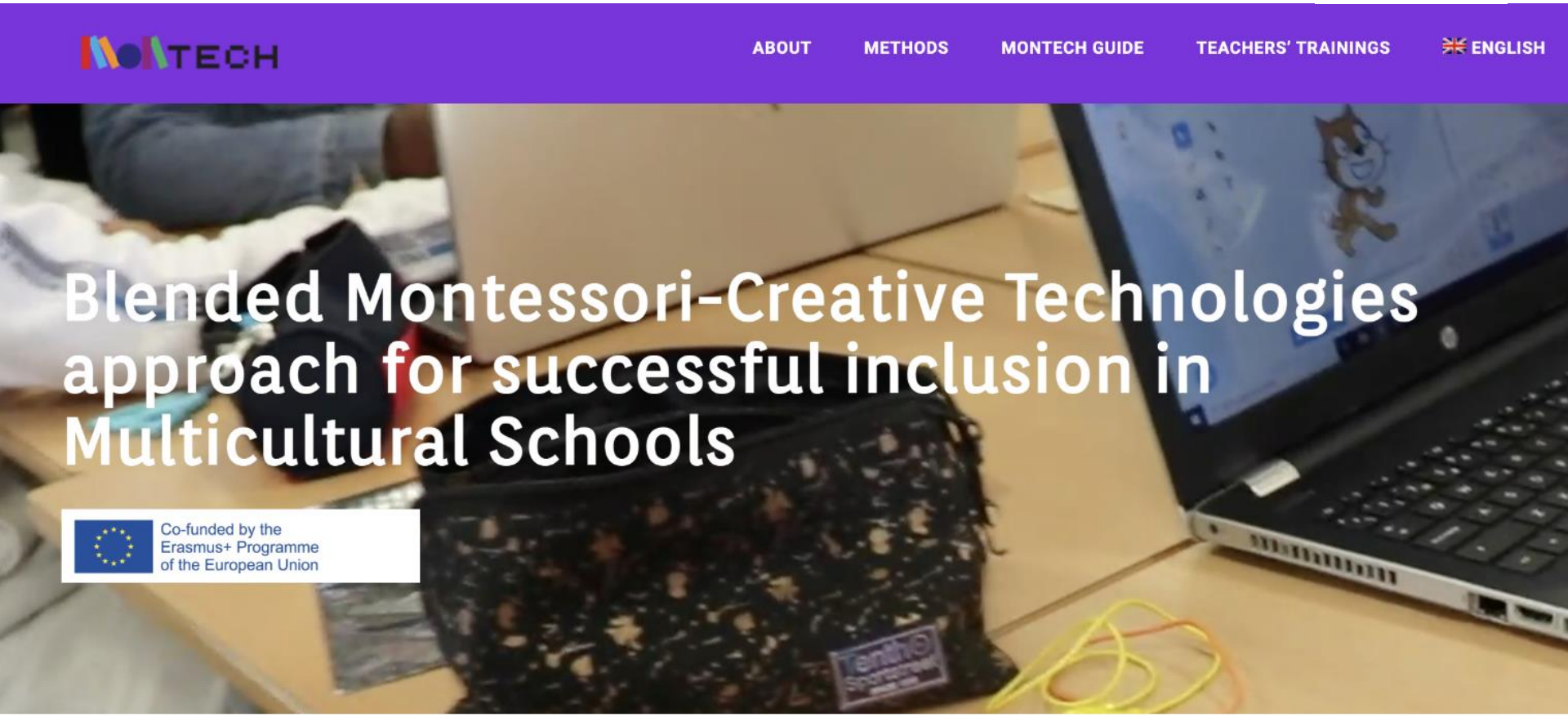

What is MONTECH project?

Montech project will foster social inclusion and equity in multicultural schools across Europe through highly innovate and engaging activities based on a new

https://montessoritech.eu/

Primary school teacher guidance book

Posted on September 21, 2022 by admmontech

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Primary school teacher guidance book

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- MonTech KOM

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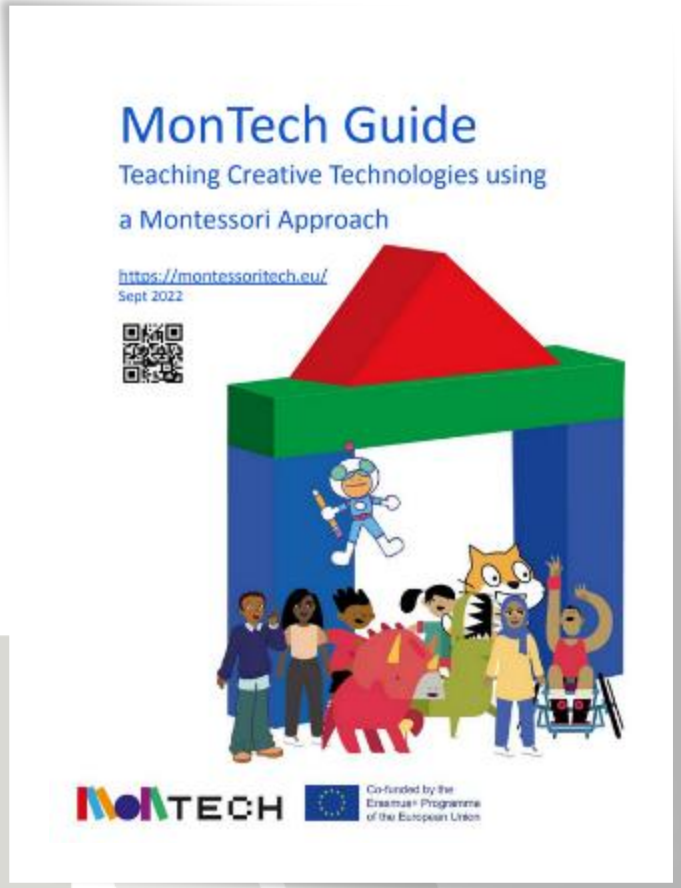

MonTech Guide

Introduction to the methodology

Chapter 1.

The Great Story of Technology

Chapter 2.

Fundamentals of Creative Computing

Chapter 3.

Incorporating Technology Across the Curriculum

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Structure of the workshops

create

The teacher presents three instructions to the children, drawing arrows on the board. Each arrow is an instruction. The up arrow is the instruction that tells the robot to take a step forward. The right arrow tells the robot to turn right (you can explain that it turns 90 degrees,depending on the children's knowledge - it is simply a matter of showing the teacher that if this arrow reaches the robot, it turns right 90 degrees). The same with the left arrow.

Then the teacher explains that one child will play the role of the robot and between the two of them they will program it. This is done by writing one instruction after the other. This is writing a sequence of instructions.

The teacher gives a demonstration. He writes the sequence (drawing on the blackboard): "up arrow", "up arrow", "right arrow", "up arrow". It is a program of 4 instructions.

Then she asks for a volunteer to act as a robot, a "kidbot". She loads the program into the robot's hands and touches (as if pressing a button) its head gently. The kidbot moves one step forward (executes the first instruction: "up arrow"), one step forward (second instruction), turns right (third instruction), and one step forward (fourth instruction).

After this demonstration, the teacher divides the children into teams and asks them, to program the kidbot to make a square. The teacher can use a chair for the kidbot to complete a lap of the chair (see image below).

play

share

After this first challenge, children can do multiple things, like set up a circuit setting a second challenge, invent instructions (jump, grab with hands, talk, repeat, etc...), dress the kidbot with cardboard, or/and build a helmet. This activity can also be very interesting to introduce conditionals: *if* this condition happens *then* do this action. Suggest to a group of children to program their kidbot in a way that uses conditions.

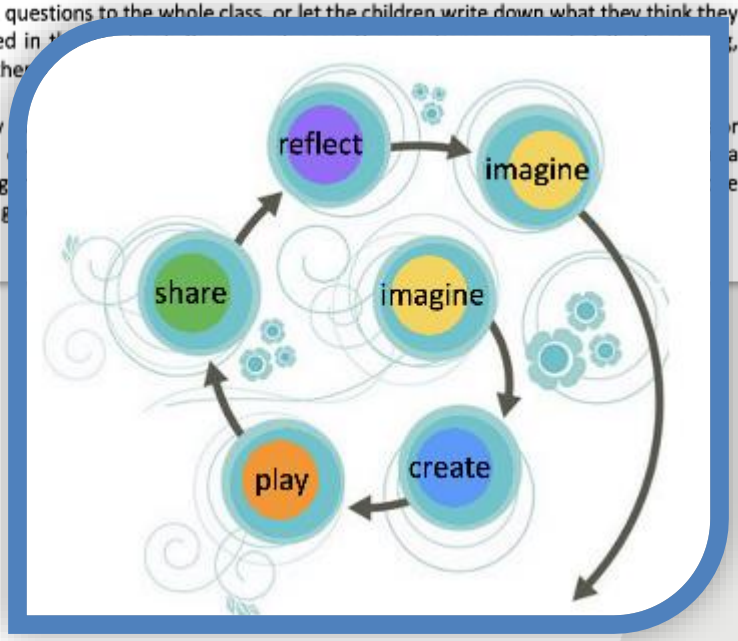
You can also extend this activity to work on some important practices. For instance, children can also swap programs, and have the different kidbots in the class run programs that their classmates have made.

All these activities can be done in the classroom or in the playground (or in any other space).

reflect

Before finishing this workshop, give children time to reflect on what they have been doing. You can ask questions to the whole class, or let the children write down what they think they have learned in t
about whethe

A good way
invent new
robot. Using
around the g



Spiral of Creative Thinking, M. Resnick (2007)

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unplugged

plugged

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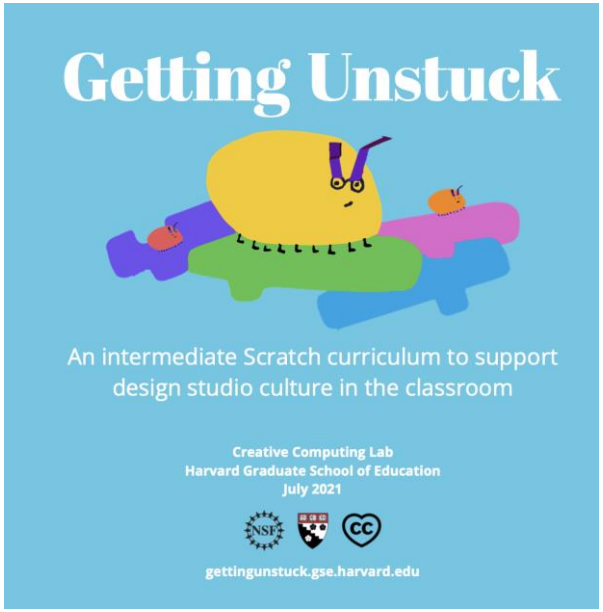
MonTech Guide is inspired in:

https://scratch.mit.edu/

CREATIVE COMPUTING

Harvard Graduate School of Education



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Special focus: structure of the sessions

- Whole class spark (story, anecdote, unplugged activity or presenting a project)
- Free choice follow-up activities in groups or individual
- Small groups demonstrations (introduce a key concept, ask questions, present a challenge and encourage them to work independently in a follow-up activity)
- Feedback between pupils
- Individual journal reflections

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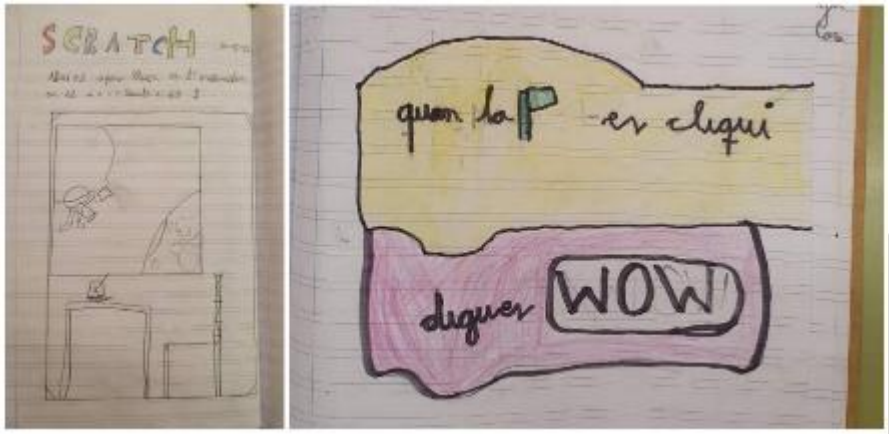
Special focus: Journal

In the guide you will find activities that will make reference to the design journal. For example, students can write down what they liked about a project, draw characters before going to the Scratch graphic editor, or give feedback to a peer about their project.

- To plan and document
- To give feedback and reflect
- To sketch and draw
- To brainstorm



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Special focus: Feedback

https://vimeo.com/38247060

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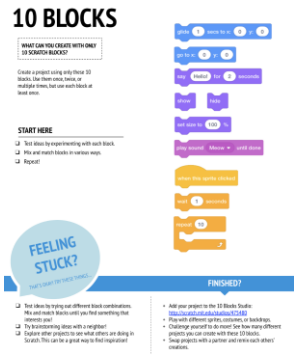
Discovering Scratch: Different ways of learning



create
play
Pupils create a script, combining the instructions blocks of the envelopes. Then, the idea is that one of the children does what the program says (like the kidbot).

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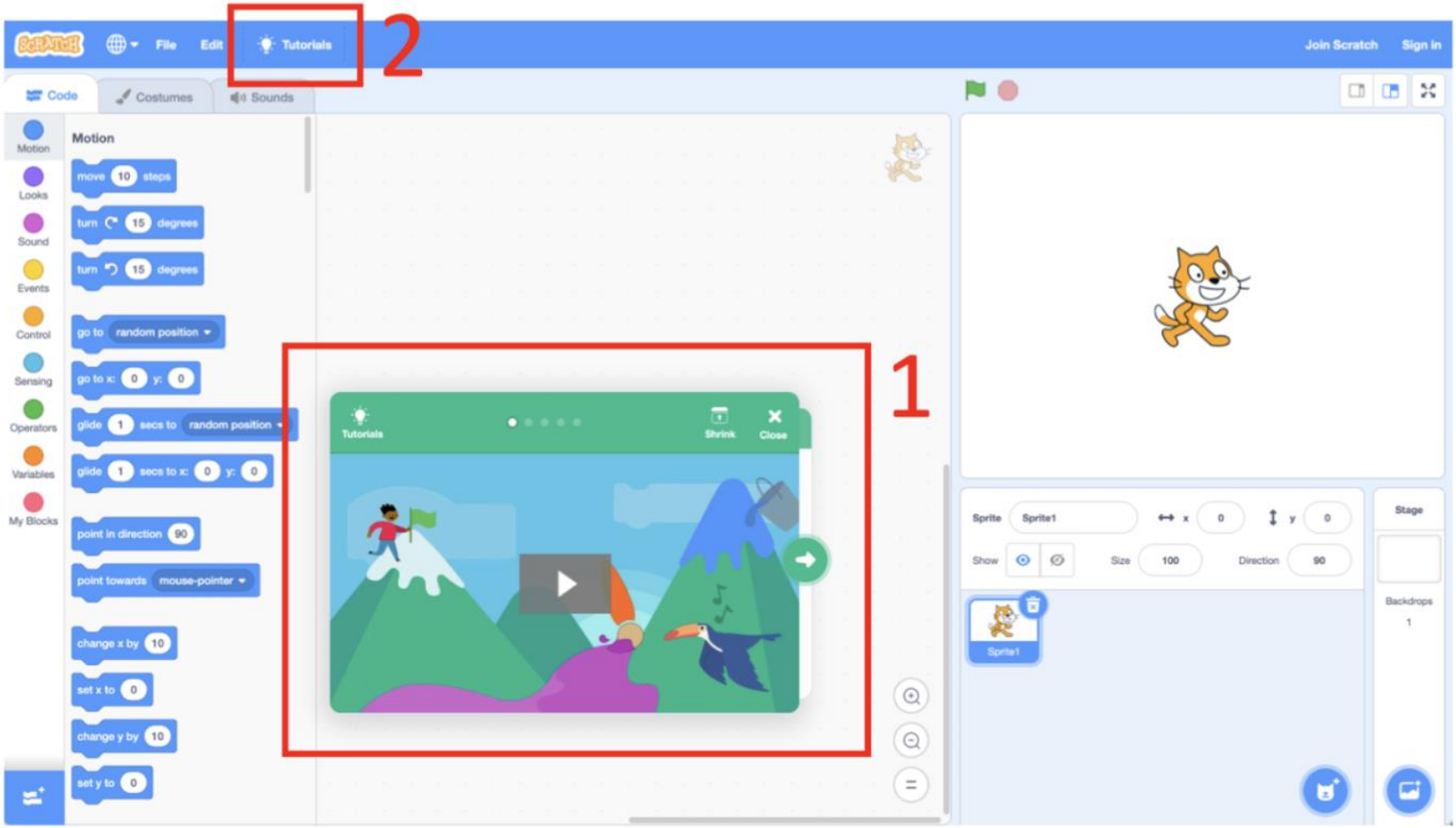
W2: Discovering Scratch with Tutorials



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W2: Discovering Scratch with a Demo

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W2: Missions with Scratch Cards

Mission X:

Hello team ____!!! (invent a team name)

Welcome to the learning experience with Scratch!

You have in your hands a collection of Scratch cards. Your mission is to explore them. You will see that they are diverse, and there will be opportunities for each of you to take control of the keyboard. You must cooperate and learn from the cards. But we also recommend that you explore things. Let your curiosity guide you. There is no danger of breaking anything in the program. We encourage you to drag an instruction to the script area, click and see what happens. We encourage you to link two, three and more instructions and click on the group to see what happens.

Get the Entire Collection of Coding Cards

With the Scratch Coding Cards, you can learn to create interactive games, stories, music, animations, and more!

Download PDF

https://scratch.mit.edu/ideas

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W2: Missions with Scratch Cards

Pair programming, children teach children

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W2: 10 Blocks Challenge

UNIT 1 ACTIVITY

10 BLOCKS

SUGGESTED TIME
15–30 MINUTES

OBJECTIVES
By completing this activity, students will:
+ create a project with the constraint of only being able to use 10 blocks

ACTIVITY DESCRIPTION

- ❑ Help students sign in to their Scratch accounts and click on the Create button at the top of the Scratch website to start a new project. Optionally, have the 10 Blocks handout available to guide students during the activity.
- ❑ Give students time to create a project with only these 10 Scratch blocks: go to, glide, say, show, hide, set size to, play sound until done, when this sprite clicked, wait, and repeat. Remind students to use each block at least once in their project and encourage them to experiment with different sprites, costumes, or backdrops.
- ❑ Invite students to share their projects in their critique groups (see the Unit 0 Critique Group activity). Optionally, have students add their projects to the 10 Blocks studio or a class studio.
- ❑ Ask students to think back on the design process by responding to the reflection prompts in their design journals or in a group discussion.

RESOURCES

- ❑ 10 Blocks handout
- ❑ 10 Blocks studio
  http://scratch.mit.edu/studios/475480

REFLECTION PROMPTS

+ What was difficult about being able to use only 10 blocks?
+ What was easy about being able to use only 10 blocks?
+ How did it make you think of things differently?

REVIEWING STUDENT WORK

+ Do projects include all 10 blocks?
+ How do different students react to the idea of creating with constraints? What might this tell you about how this student learns?

NOTES

+ It's surprising how much one can do with just 10 blocks! Take this opportunity to encourage different ideas and celebrate creativity by inviting a few students to present their projects in front of the class or by exploring other projects online in the 10 Blocks studio.

NOTES TO SELF

- ❑ _____
- ❑ _____
- ❑ _____
- ❑ _____

10 BLOCKS

WHAT CAN YOU CREATE WITH ONLY 10 SCRATCH BLOCKS?

Create a project using only these 10 blocks. Use them once, twice, or multiple times, but use each block at least once.

START HERE

- ❑ Test ideas by experimenting with each block.
- ❑ Mix and match blocks in various ways.
- ❑ Repeat!

FEELING STUCK?

THAT'S OKAY! TRY THESE THINGS...

- ❑ Test ideas by trying out different block combinations. Mix and match blocks until you find something that interests you!
- ❑ Try brainstorming ideas with a neighbor!
- ❑ Explore other projects to see what others are doing in Scratch. This can be a great way to find inspiration!

FINISHED?

+ Add your project to the 10 Blocks Studio: http://scratch.mit.edu/studios/475480
+ Play with different sprites, costumes, or backdrops.
+ Challenge yourself to do more! See how many different projects you can create with these 10 blocks.
+ Swap projects with a partner and remix each others' creations.

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WORKSHOP 1: Kidbot
First Contact with Coding

In this activity, children are going to discover what a program is and the concept of a sequence of instructions, writing programs, and executing programs. A child will play the role of the robot.	**Aim**	Engage the children to think about robots, intelligence, and what is the language of robots
	Materials	Digital blackboard to project a YouTube video Paper and pencils

imagine (unplugged)

The teacher creates an atmosphere in the classroom (dimming the lights) and projects the following music video (Kraftwerk - The robots). The teacher asks the children to dance freely as if they were robots (move like robots). The teacher dances like one of them.

https://youtu.be/D_8Pma1vHmw

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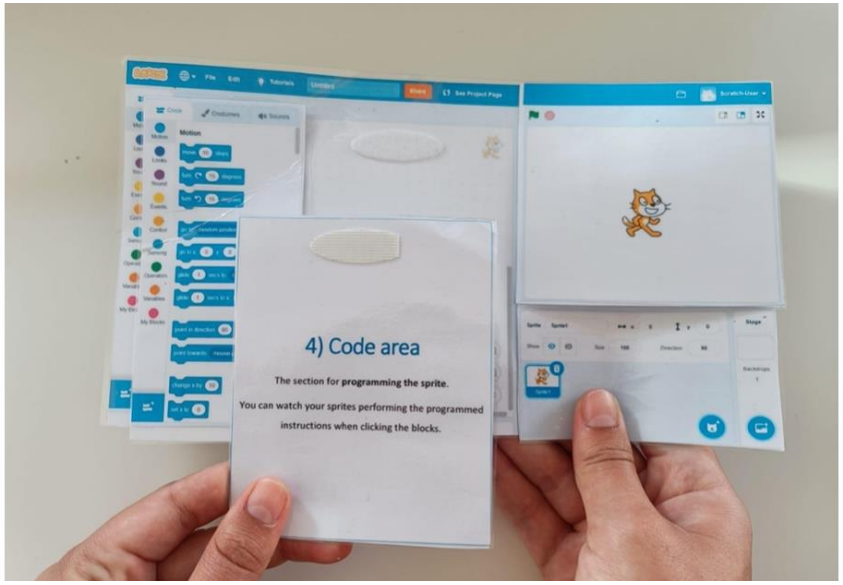
W3: Discovering Scratch with a Kidbot



create

play

Pupils create a script, combining the instructions blocks of the envelopes. Then, the idea is that one of the children does what the program says (like the kidbot).

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W2: Discovering Scratch with a Tale

https://youtu.be/eXimO7wX-iE

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W2: Discovering Scratch with a Tale

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W4: Discovering Scratch by Playing

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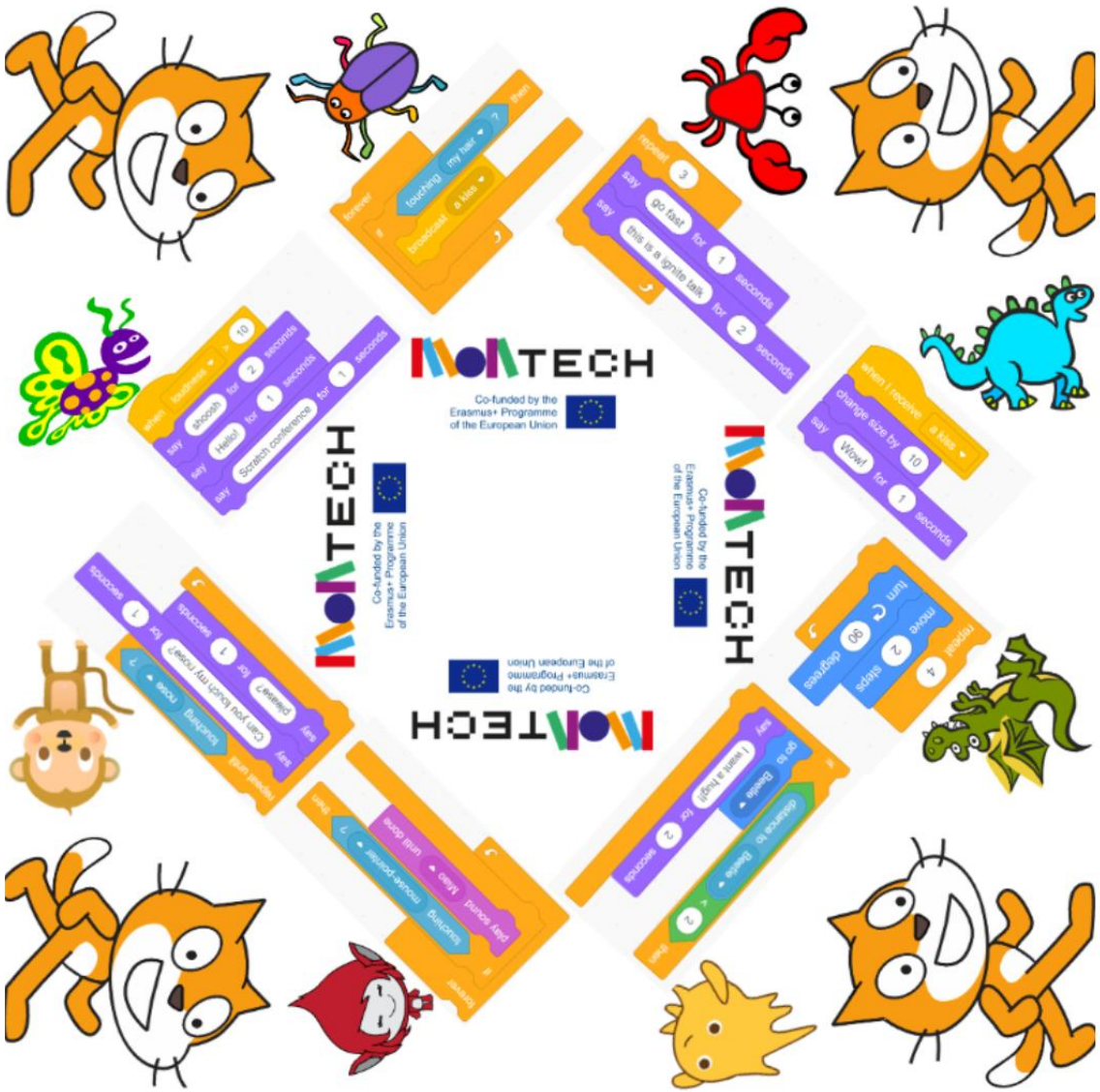
W4: Discovering Scratch by Playing



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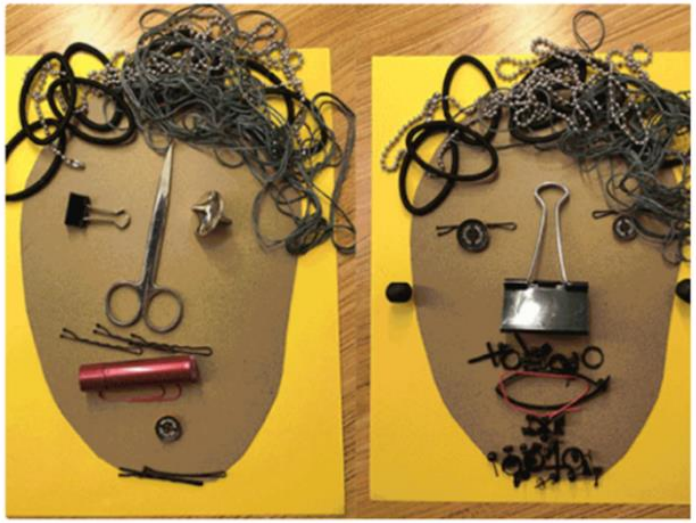
W5: Making Faces

Remixing: proposes shift, children jump from one screen to the other to continue their classmates projects

the tinkering studio

Experiments with science, art, technology, and delightful ideas.

Making Faces



Make meaningful portraits by arranging everyday and symbolic objects into faces! By incorporating objects as metaphors (like a bar of soap for your most bubbly friend), you can capture and communicate meaningful characteristics in a playful and visual way.

Dreamed up by artist Hanoch Piven, this project supports looking at everyday objects in new ways, expressive visual storytelling, and iterating on ideas.

Share what you create and try out with us by using the hashtags #TinkeringAtHome #FacesInThings.

This is an activity designed by the Tinkering Studio:
https://www.exploratorium.edu/tinkering/projects/making-faces
(© 2017 Tinkering Studio. Exploratorium).

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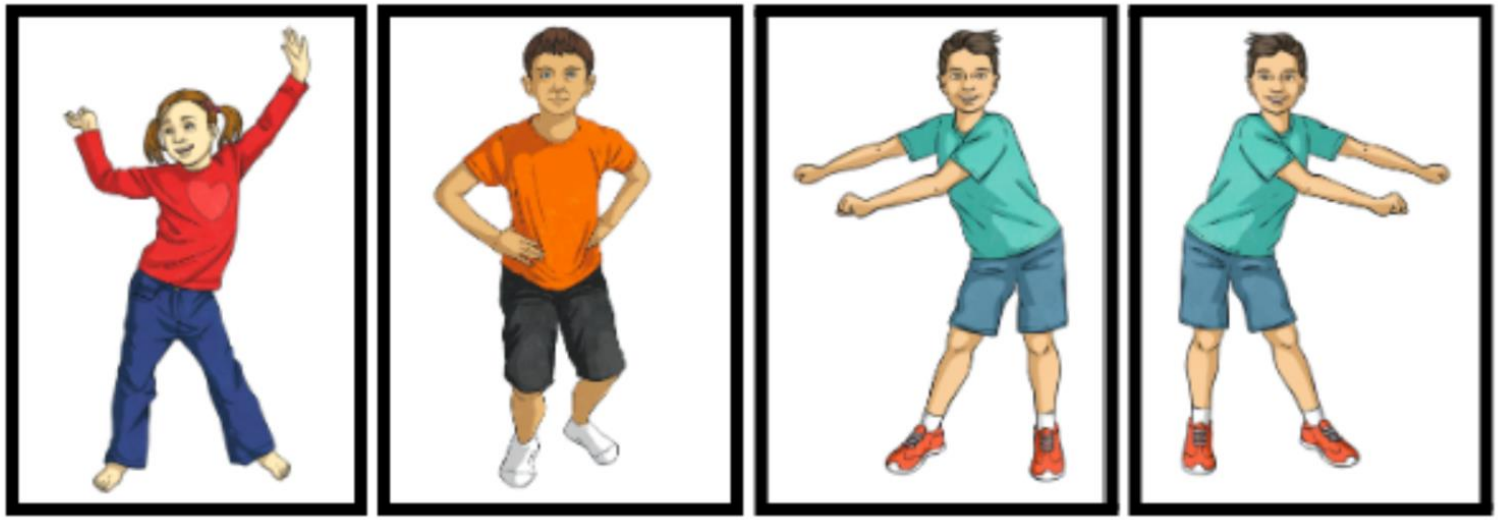
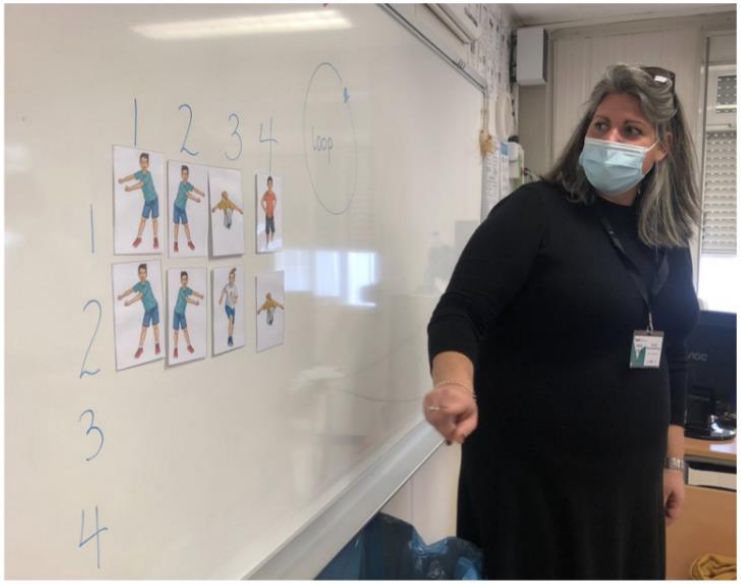
W8: Loops - Create a Dance





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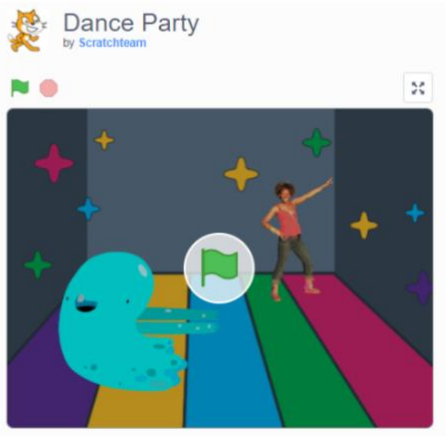
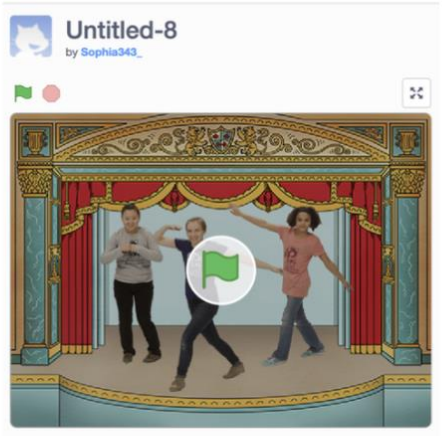
W8: Loops - Dance Party

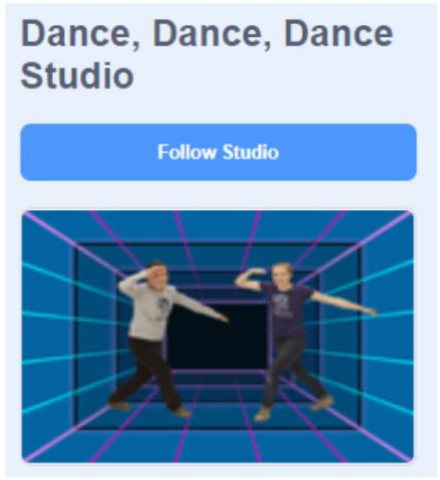


https://scratch.mit.edu/projects/10128067/



https://scratch.mit.edu/projects/588135512/

https://scratch.mit.edu/projects/340824565/



Or you can also explore the studio:
https://scratch.mit.edu/studios/1065372/

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W13: Monsters with Variables

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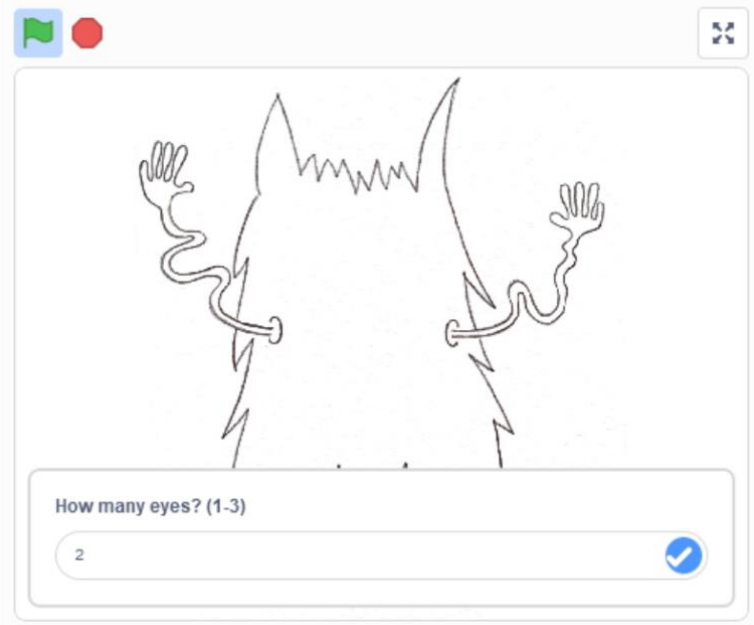
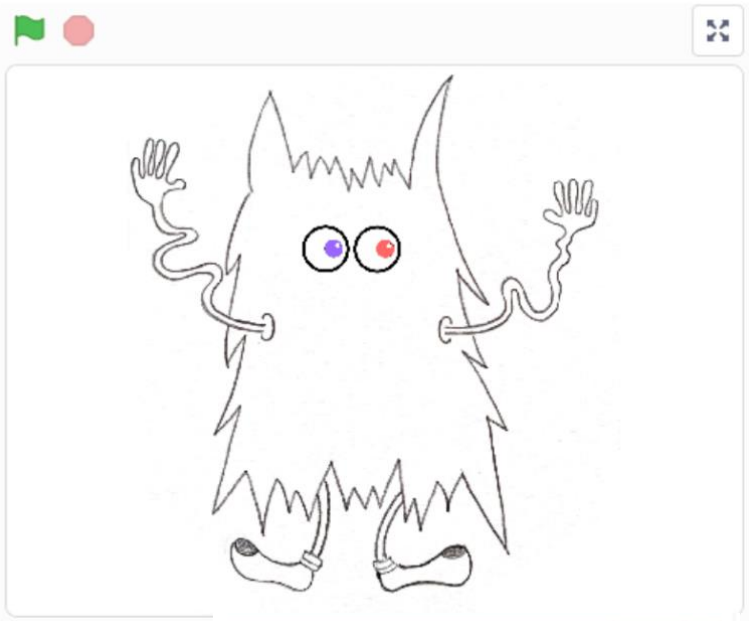
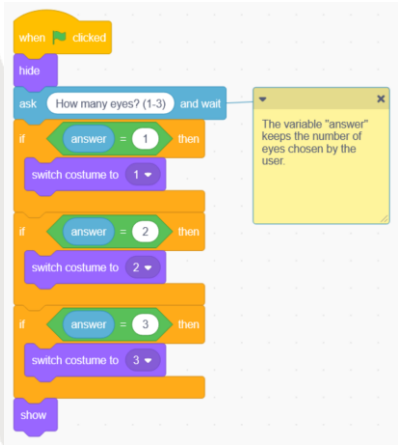
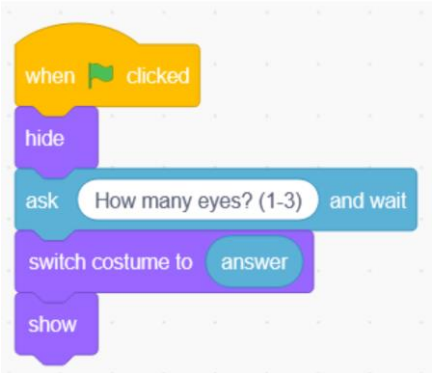
W13: Monsters with Variables

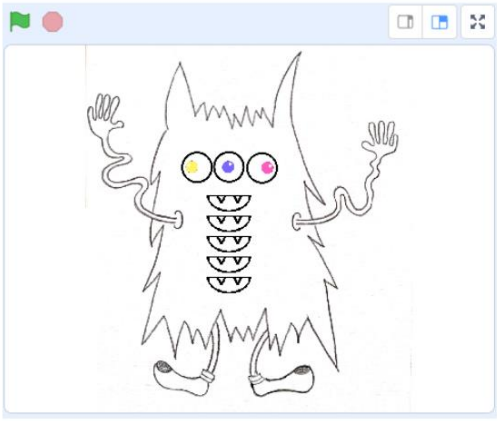
Debugging: review and fix exercise











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What will we do in the session?

1) Project Context

2) Montessori principles

3) Creative Technologies

4) Why would Maria Montessori embrace Creative Technologies

5) Workshops Sequence

6) Teachers Testimonials

5) Discussion

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Schools in Romania

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Needs That Need to Be Addressed

- Lack of school facilities
- Too many students in one class
- The study subjects are too difficult
- Teacher-students interaction insufficient
- No methods of active participation
- Too much time spent on teaching

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Teachers' Testimonials

"I also learned something from my students: they reminded me how important teamwork is and they made me realise how creative they are and that teacher talking time should be reduced in favour of student thinking time."

Cristina, Plenita School, Romania

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Teachers' Testimonials

"I could see them being more friendly to each other, they were having fun, all of them."

Alexandra, Romania

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Teachers' Testimonials

"Children created an imaginary world with the help of MonTech."

Simona, Romania

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Teachers' Testimonials

"They worked together, helped each other, asked a lot of questions. They were curious."

Ana, Inclusive Education Centre, Romania

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Students' Testimonials

"I realized that all my colleagues are like me."

Ema, Romania

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Students' Testimonials

"I found out that you need to try again and again in order to succeed."

Mihai, Romania

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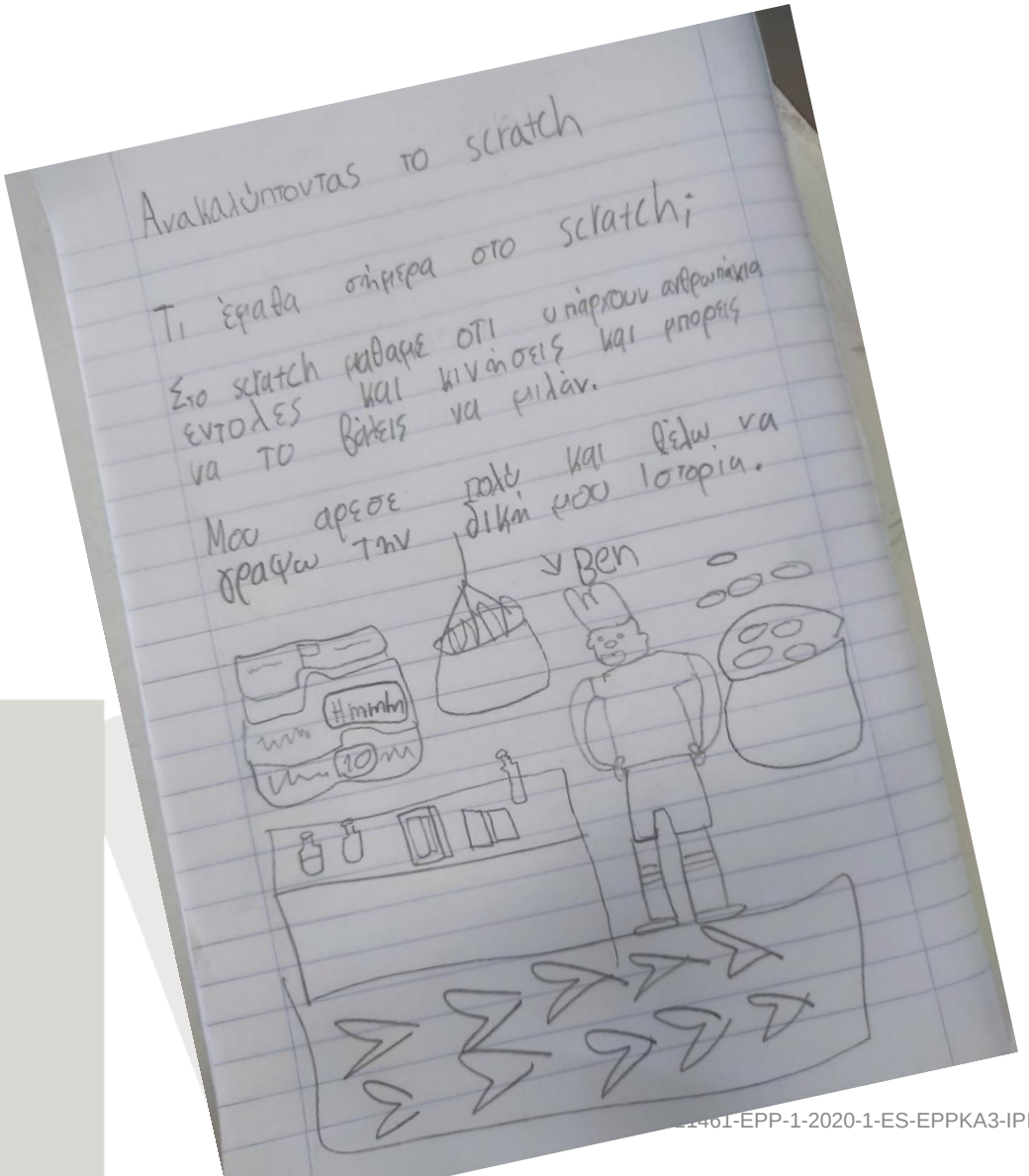
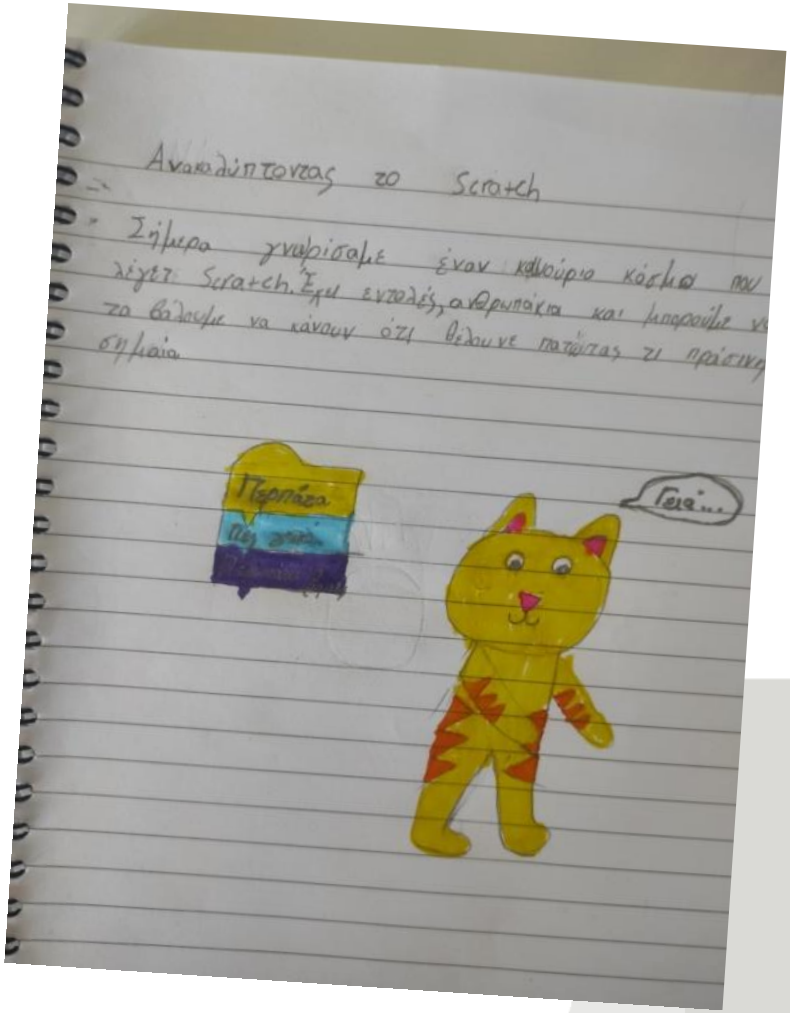
Students' Testimonials





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Students' Testimonials

'I worked better within teams.'

'We helped each other.'

'I had more freedom.'

'Time passed by faster while working with technology.'

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Strong Points

- ★ Cross-curricular activities increase attractiveness
- ★ Strongly connected to the curricula used in Romanian schools
- ★ Elicits collaboration in class
- ★ Immediate creativity
- ★ Enables them to solve problems they encounter
- ★ Trains teachers to adopt new methods or update their own
- ★ Trains teachers to use technology during classes
- ★ Within mixed groups older children help smaller ones

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Weak Points

- Students find working in a team challenging when working in Scratch
- 1st grader's low level of reading skills made them dependent to the teacher
- Refugee/Minority/Migrant students have a low school presence which weakened MonTech impact
- Teachers level of adaptability to a different approach when teaching

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Athens “homework”

- Bring a notebook that you like and think is practical to use as a journal
- Watch “Austin Butterfly” video
- Explore the “MonTech guide”
- Try to create a small Scratch project based on the guide and upload it to the “Acadimia-Scratch studio”

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Acadimia internal training
21 Sept. 2023

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Blended Montessori-Creative Technologies approach for successful inclusion in Multicultural Schools

Sarah Kennedy-Berge – Waterpark Montessori International (Norway)
Maria Berrocal, Eduard Muntaner, Jordi Freixenet, Marta Peracaula – University of Girona (Spain)

WATERPARK MONTESSORI

UdiGital

Universitat de Girona