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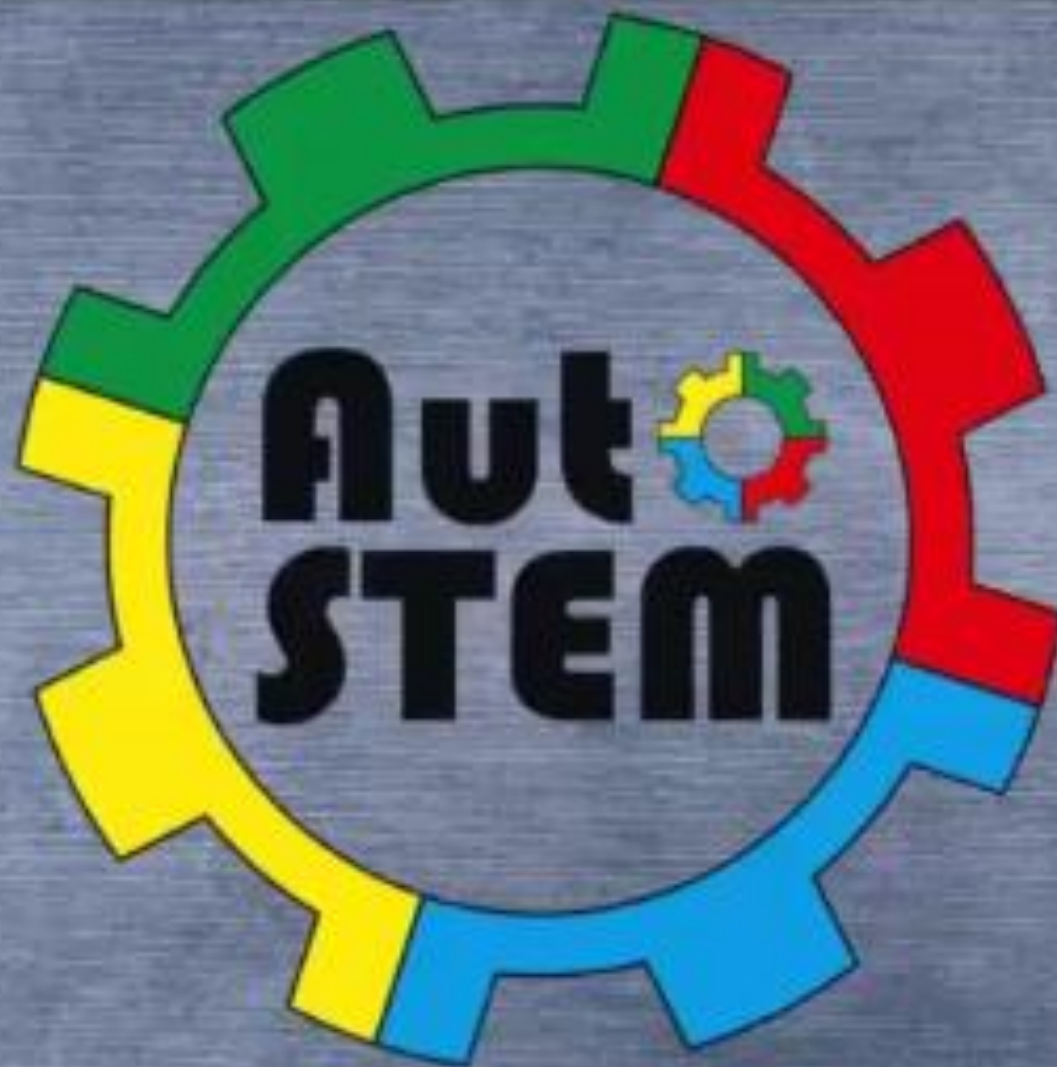
The community for science
education in Europe

Scientix webinar: AutoSTEM – automata to teach STEM subjects to young learners

Presenters: Joel Josephson and Oliver Thiel



Date: 22 September 2020



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AutoSTEM – automata to teach STEM subjects to young learners

Erasmus KA201 large-scale project to create innovative resources

For students from 4 to 8 years

- How they introduce STEM areas?
- What are automata?
- What are they made from?

Partners

University of Coimbra Portugal, Queen Maud University College Trondheim Norway, 32 SU School “Sv.Kliment Ohridski” Sofia Bulgaria, Eureka@ Perugia Italy, Kindersite UK



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AutoSTEM – automata to teach STEM subjects to young learners



- **Step by Step Teacher Guide**

- What are automata and STEM.
- The theoretical framework and pedagogical concepts.
- Key concepts for constructing automata



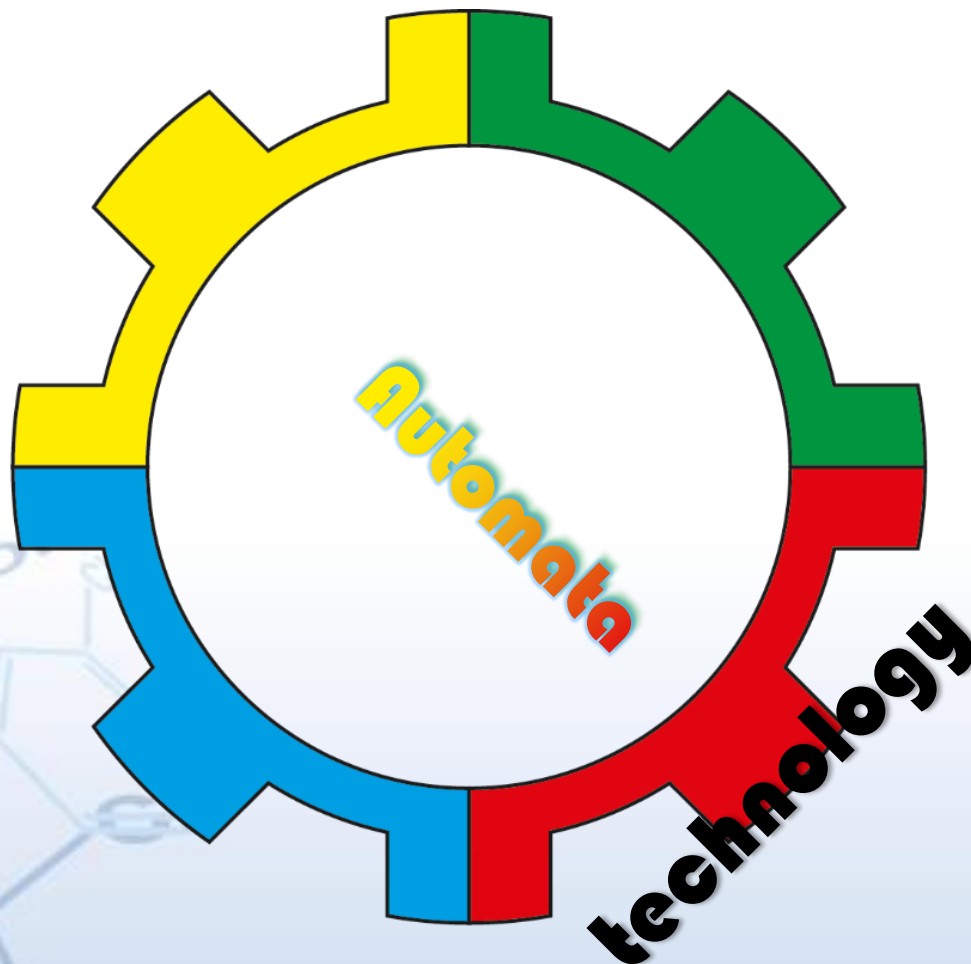
- **Automata Pedagogical Guidelines and Construction Instructions**

- Detail on the next section
- **Scenarios to implement Automata.**

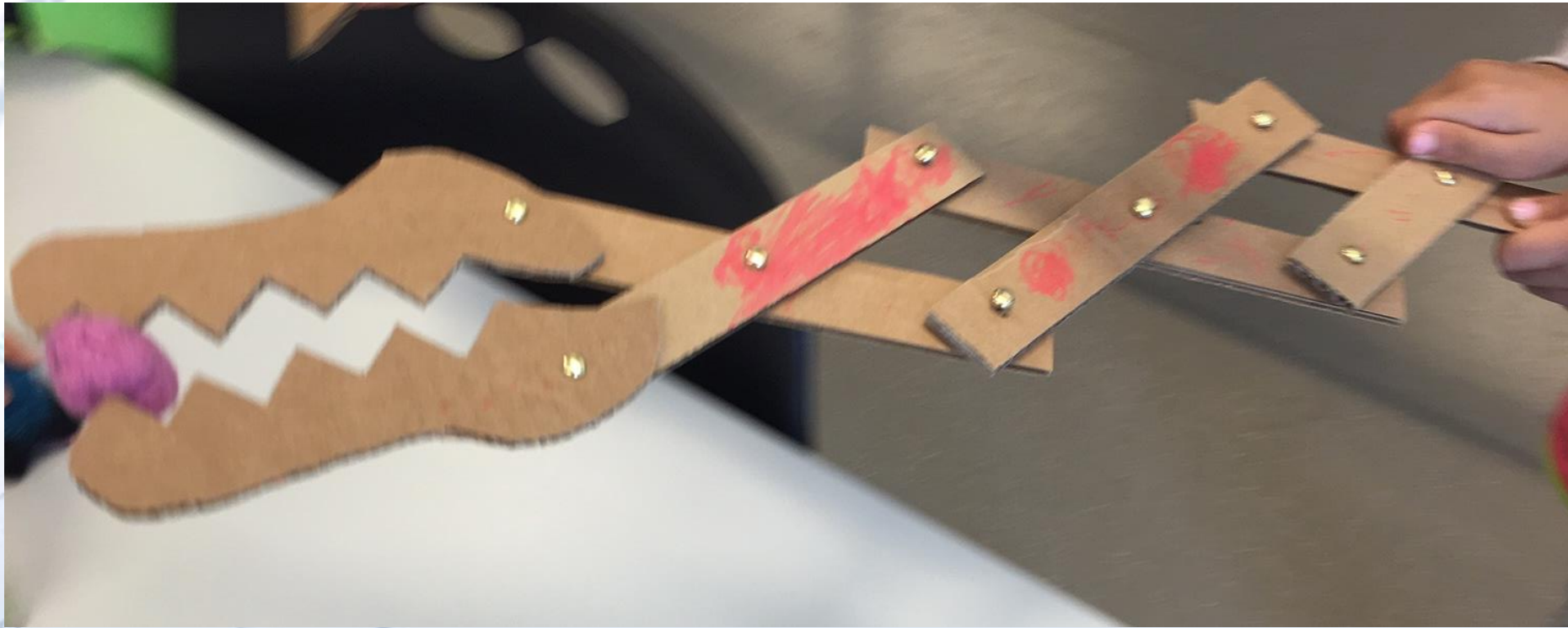
- Ideas how to take the ideas further holistically and in to additional subject areas

- **Resources for planning and reflection**

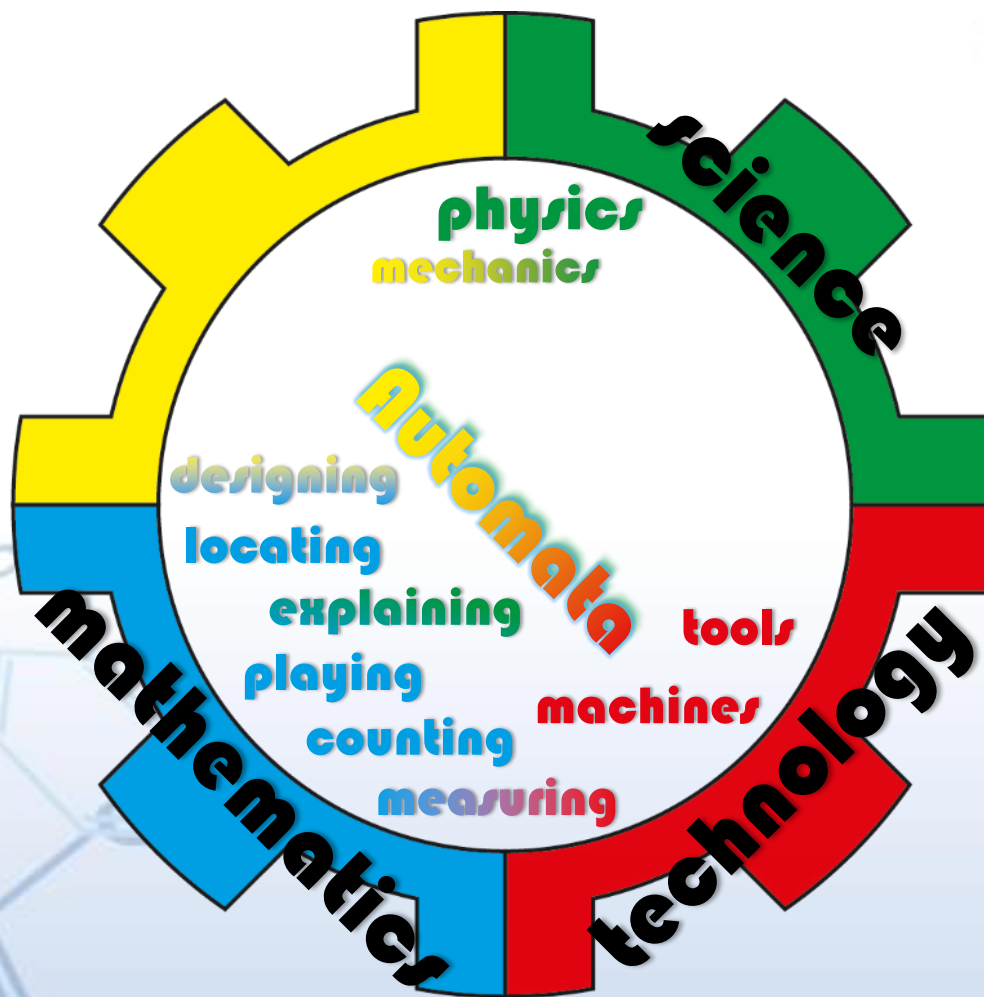


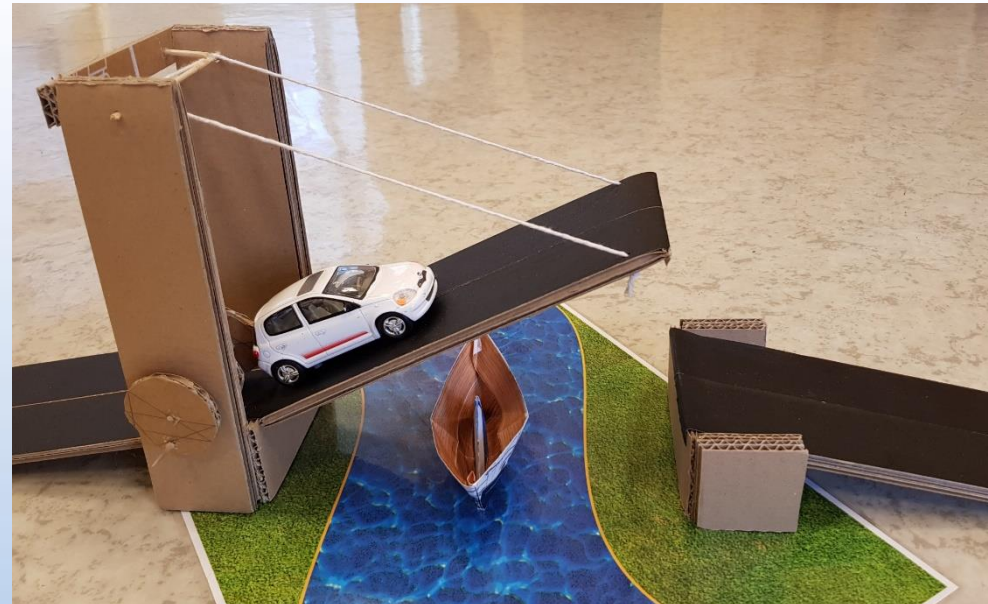
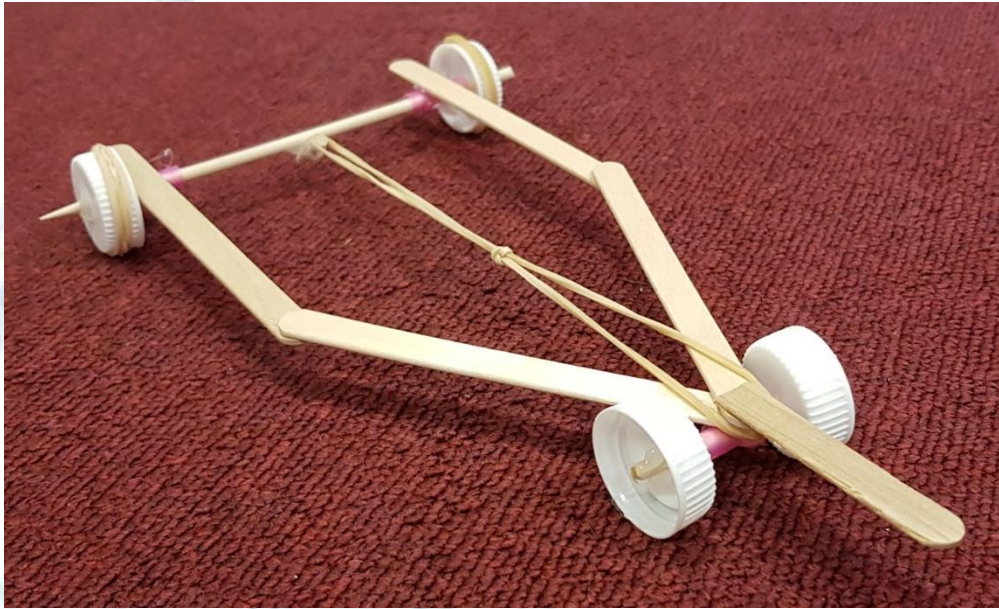


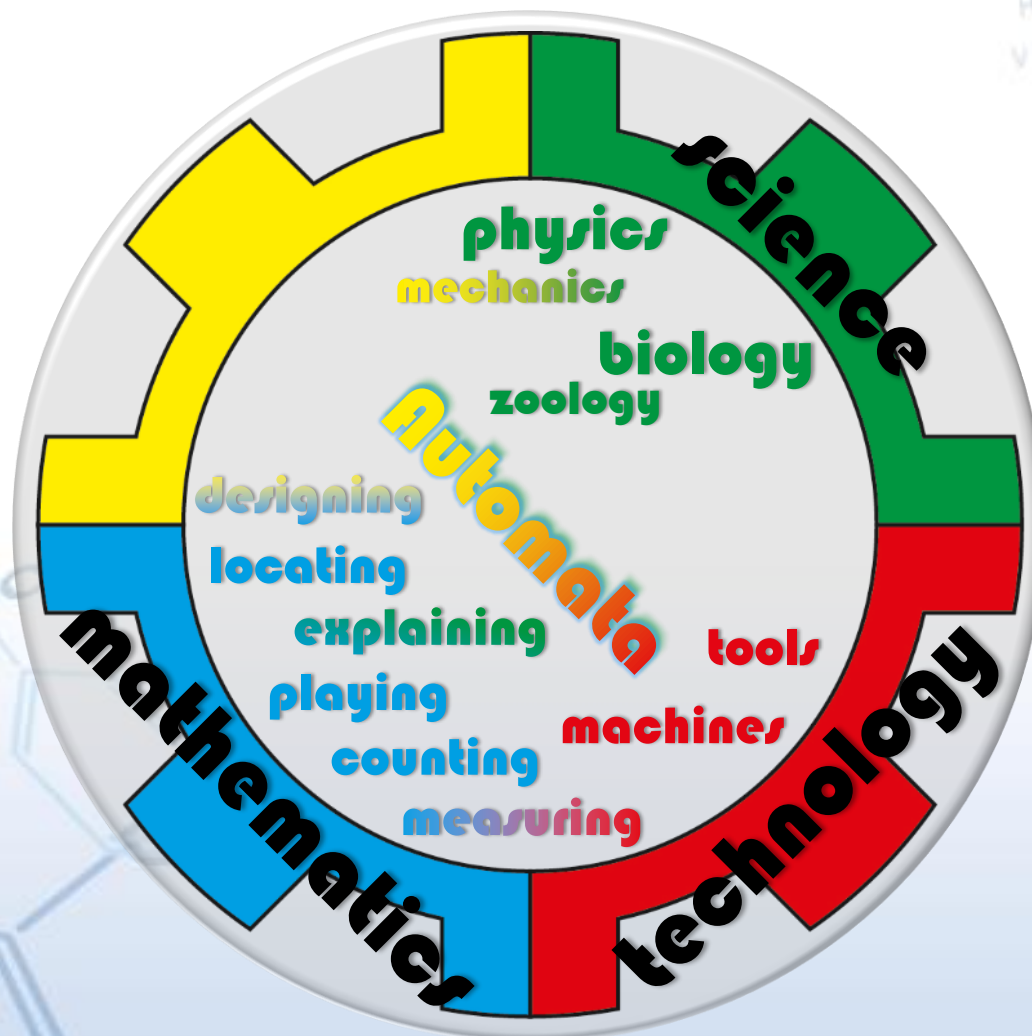


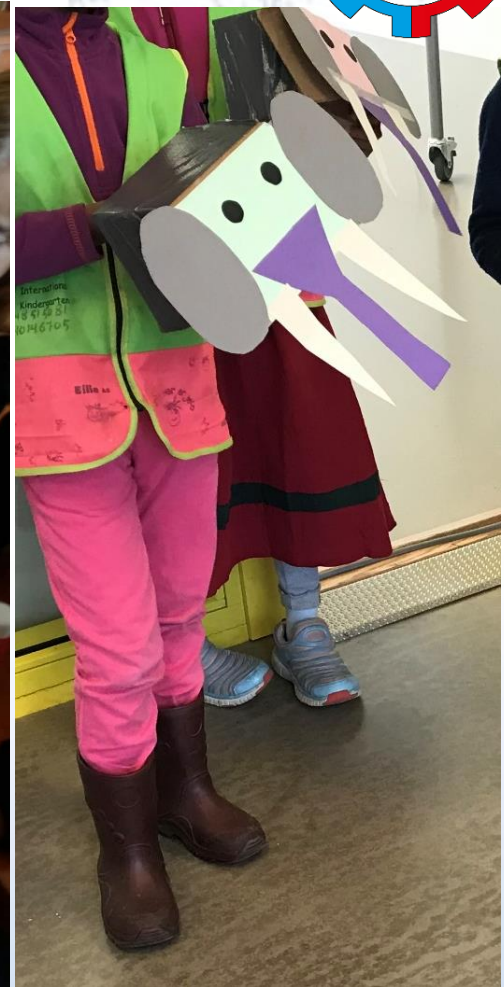


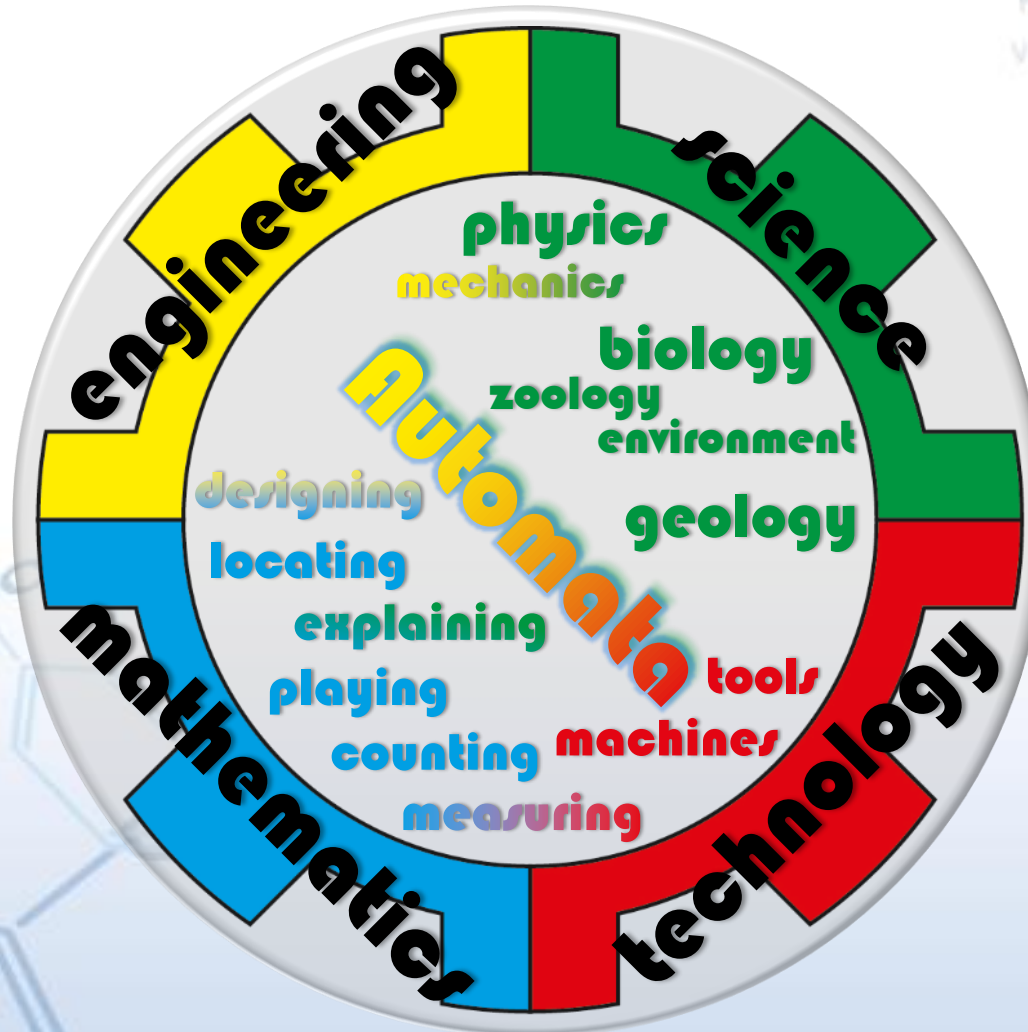
Mathematics + Science

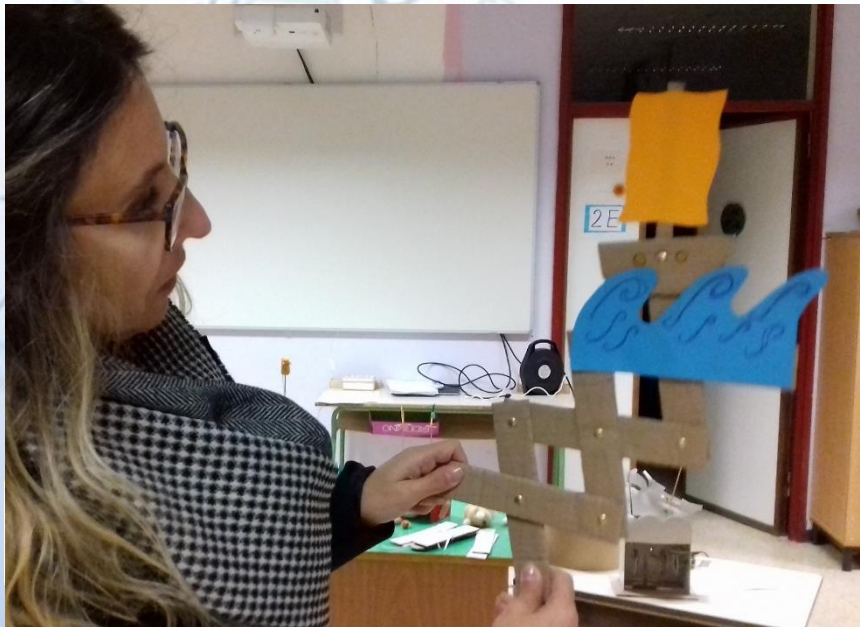












- Children's play with automata is important
- The project facilitates creativity and wonder
- The workshop is interdisciplinary
- Do not do too much at a time
- Provide enough time
 - to build automata
 - for exploration
 - to test and play with the automata
- Do not have too many children in the group

	N	Minimum	Maximum	average	Standard deviation
Value/ usefulness	26	4.00	7.00	5.67	.78
Interest/ joy	26	4.80	6.80	5.92	.61

AutoSTEM – automata to teach STEM subjects to young learners

- [Jelly Bird](#)
- [The Talking Elephant](#)
- [The Dancing Doll](#)
- [The Balloon Car](#)
- [The Amphicar](#)
- [The Snapping Crocodile](#)
- [The Catapult](#)
- [The Acrobat](#)
- [The Wind Turbine](#)
- [The Colour Spinning Disk](#)
- [The Eco Car](#)
- [The Elevator](#)
- [The Drawbridge](#)
- [The Returning Tin Can](#)
- [The Grabbing Hand](#)
- [The Two Faces](#)
- [The Butterfly](#)



AutoSTEM – automata to teach STEM subjects to young learners



Pedagogical guidelines and construction instructions

This is an automata that is suitable for using with children between the ages of 3 to 8 years. The Jellybird is a fun and engaging way that children can be introduced to number of mathematical concepts and it can also bring children closer to learning about birds.

- Areas of learning include:
 - Spatial imagination (shapes and placement)
 - Twice
 - Inside/outside
 - Round and pointed
 - Narrow and through
 - Either side, left-hand side and right-hand side
 - Up/down
 - Symmetry, and mirror symmetry

What areas of STEM learning are included



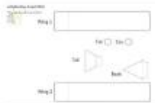
How to make video

1. Instructions – how to use the Jellybird to teach Math concepts and Step by step guide – click here
2. Templates:..
 1. To be printed on paper (see image below to download)
 2. To be printed on card (approx. 220GSM) (see image below to download)
3. Video tutorial (see above)
4. Videos of children making the Jellybird (see below)

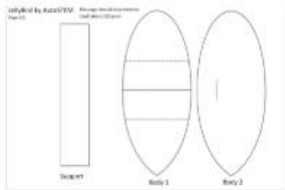
Full teachers step by step guide



Media examples of children making the automata



Print this template on paper
Click here to download the template.



Print this template on card (220 gsm)
Click here to download the template.

Templates to print off

JellyBird by AutoSTEM

This page should be printed on paper
Page 1/2

Wing 1

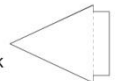


Eye ☐ Eye ☐

Tail



Beak



Wing 2





- **Introducing STEM Concepts**
- **How to construct the JellyBird**
- **Parts and tools**
- **Method**
- **How the JellyBird can be used to learn STEM**

<https://www.autostem.info/step-by-step-guide/>

Activity details:

The body is round, but not a circle.

It is oblong and pointed at one end.

There is a left-hand side and a right-hand side of the body.

The wings are rectangles. A rectangle has four sides and is oblong. There will be one wing on either side of the bird.

The eyes are round, almost like circles. There will be one eye on either side of the body.

The beak is a triangle. It has three corners. The sharp corner points outwards. The bird uses the beak to pick. The beak will be in the front.

The tail is a trapezium. It has four sides. The widest side points outwards. The bird uses the tail to steer. The tail will be in the back.

This guide has 2 parts:

1. How the JellyBird can be used to introduce a number of mathematical concepts
2. How to construct the JellyBird (your children can make the JellyBird)

The construction and use of the JellyBird allows the teaching of a number of mathematical concepts within the construction and assembly process.

On finalisation, the JellyBirds, can then be used in additional ways. Some ideas include:

- Creating groups that mimic how flocks of birds fly together, here are 2 examples:
 - Startings nomenclature: <https://www.youtube.com/watch?v=us4Xt5aenY>
 - Flying with geese <https://www.youtube.com/watch?v=VpMnGKx28>
- Bringing preschool in to the home. The birds could be used within a bedtime story. Here's a freely available example <https://www.storjumper.com/books/index/20319568/The-Bird-Who-Couldn't-Fly>
- Adding additional wing shapes (also opportunities for other geometric shapes)

1. Introducing Mathematical Concepts

When the children colour the JellyBird, they have to use their **spatial imagination** to visualise how the parts will fit together and what the bird will finally look like. The teacher talks with the children about the different parts, their **shapes** and **placement**:

- The body is round, but not a circle. It is oblong and pointed at one end. There is a left-hand side and a right-hand side of the body.
- The wings are rectangles. A rectangle has four sides and is oblong. There will be one wing on either side of the bird.
- The eyes are round, almost like circles. There will be one eye on either side of the body.
- The beak is a triangle. It has three corners. The sharp corner points outwards. The bird uses the beak to pick. The beak will be in the front.
- The tail is a trapezium. It has four sides. The widest side points outwards. The bird uses the tail to steer. The tail will be in the back.

Since we need two supports that have to be cut out of carton material, the teacher talks about the concept twice. The children use one template twice to get two supports.

Automata for STEM
<https://www.automataforstem.info>
 Contact: info@automataforstem.info

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When the children stick the beak and the tail to the body, the teacher talks about the inside and outside of the bird. The children have to stick the beak and the tail to the inside. Furthermore, the teacher uses the concepts **round** and **pointed**. The children have to stick the beak to the round side and the tail to the pointed side.

When pushing the support that carries wings through the body, the teacher can talk with the children about the mathematical concepts **narrow** and **through**. The support has to go through the narrow gap.

When bending the wings, the teacher talks with the children about the concepts **down**, **either side**, **left-hand side** and **right-hand side**. The children have to bend the wings down on either side, one on the left-hand side and one on the right-hand side of the bird. The wings are symmetrical, they have a **mirror symmetry**, i.e. they look the same on either side but point in different directions – one to the left and one to the right.

When playing with the bird, the teacher talks with the children about motion and the concepts **up** and **down**. We move the support up and down. The wings flap up and down. The bird flies upward in the air and then forward.



Thank you for your attention



Website : <https://www.autostem.info>

Videos : <https://www.youtube.com/channel/UCaVYKg0qYXnUNNdqwNtLAVQ>

Facebook : <https://www.facebook.com/AutomataforStem>

Email : joel@kindersite.info



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