Otto DIY Teaching Methodology

Our educational content is based on a methodology designed by Iván Artiles.

This teaching approach divide the full class period into 5 sessions: *(1) Connect - (2) Make - (3) Debate - (4) Rethink - (5) Remake*.

🔤What is this methodology about?

This is a Project-Based Learning methodology with a Student-Centered approach that helps students to gain knowledge through completing projects, as well as to develop skills such as research, critical thinking, collaboration and other important STEAM skills.

⚙️How it works?

Each session of this methodology has a particular focus to complete specific “session goals” related to the topic of the class. Once the teacher has connected the students with the class project they will proceed to develop the activities, then comes a debate session that triggers a process of rethinking and remaking the project.

🔍***Let’s explore each session!***

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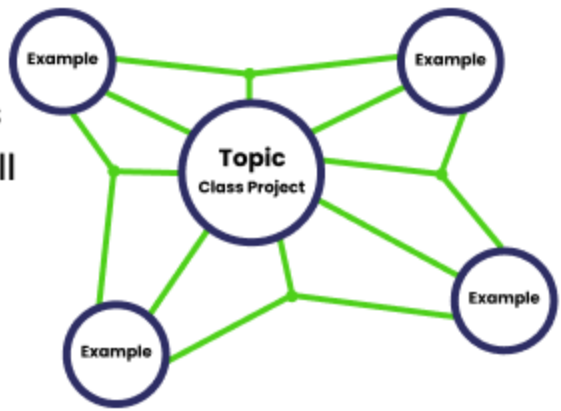
🔗Connect

⏱️15% of the full class period

During this session the teacher must capture the attention and interest of students by creating a connection between the topic of the class (the project of the day) and real-world examples where the project could be useful.

The key is to show students how the knowledge they will learn can be applied in an everyday situation.



For this session the teacher use different multimedia elements to show the real-world examples.

The teacher must guide the students to connect the topic of the class with the examples shown.

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🔗Connect

This connection can be made through a Q&A session where the teacher ask students about the example shown, and using the answers must drive students to the class topic.

For example, let's imagine that the class project is **create algorithms for** 🤖. In this case, in the **🔗Connect** session, we need to take our students to understand **what an algorithm is**. How can we do this?

A good example, widely used in CS, is creating an anology with a **set of instructions to complete a daily life task**.

We could ask students to write the instructions to make a sandwich and then explain them that this set of instructions is an algorithm.

The process to take students from creating instructions to prepare a sandwich to understanding what an algorithm is can be through a Q&A session like the one shown below.

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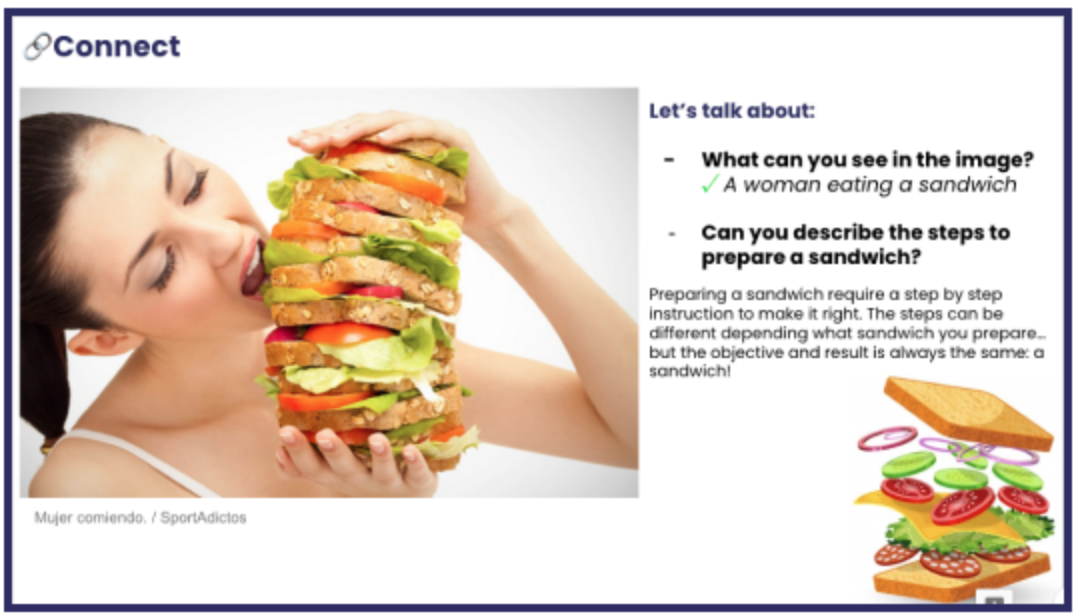
🔗Connect

We can start by showing only the image and asking ***what do you see in the image?***
Answers will vary but always around the same: **a woman eating a sandwich.**



After introducing the sandwich, we can ask students to describe (it can be a written activity) how to make a sandwich; in this point they will be indirectly creating an algorithm!

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🔗Connect

Once the students have created the instruction set to prepare the sandwich, we can explain that this is the same as an algorithm.

🔗Connect

A set of instructions to accomplishing a task (make a sandwich) or even solving a problem (not be hungry) is called “an algorithm”.

When you write the instructions to prepare a sandwich, you are creating an algorithm that someone else can execute to prepare a sandwich too!

To reinforce the understanding of the concept and reach the final goal (algorithms for 🤖) we can **show more examples of algorithms**.

Besides preparing delicious sandwiches, algorithms can also be use for more technical stuff, for example...

Describe steps for changing a bulb 💡

Recommend you series & movies 🍿📽️

Or even give instructions to a robot!🤖

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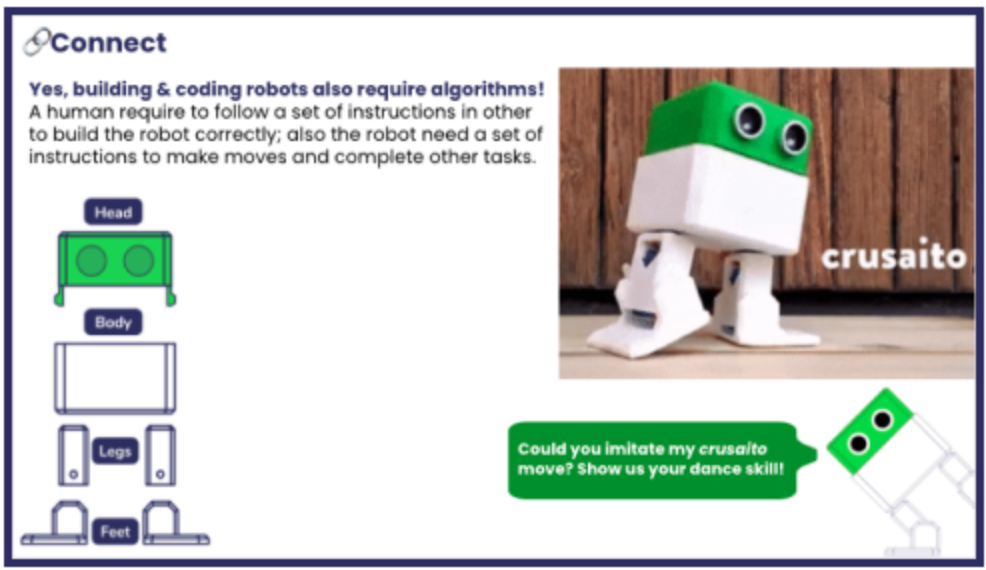
🔗Connect

Having students into the main topic, our connection process will be complete!🎉



Once the students are connected to the class topic, it is time to *hands to work!*

This will be done in the 🛠️**Make** session. 👉🏼

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🛠️Make

⏱️40% of the full class period

Once the teacher had introduced students into the project, it is time to make! In this session **students will make all the work** by themselves, the **teacher will be** limited to be **a suporter** in case someone need help.

Also, the **teacher may provide bite-sized knowledges** to the class during this session in order to help them to complete a specific part of the project.

We **recommend dividing the class into small groups** (2-4 students) to work together in order **to introduce the collaboration skill** into the class.

Teacher as supporter

Students team work

Bite-sized knowledge

To know more about "Student-Centered learning", you can read:
Overby, Kimberly (2011) "Student-Centered Learning," ESSAI: Vol. 9 , Article 32.
Available at: https://dc.cod.edu/essai/vol9/iss1/32.

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🛠Make

The key of this session is to **complete a first full version of the class project**; but also it is important students **create documentation of the project** during this session.

The teacher could create worksheets with specific items & requirements to help with the documentation as well as allow students to create their own writing from a blank paper. This decision can be made considering the documentation skills of our students.

Let's see an example using the same class project than before: **create algorithms for** 🤖.

For this we are going to use the *Otto Farming* platform in which we can implement algorithms to code an Otto to do specific tasks.

You can try a demo of this platform in
http://www.ottodiy.club/ottofarm-demo/index.html?01?en

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The main goal for this session will be complete the 10 levels of the 1st chapter of Farming game.

We must make sure we give a reason to students to document their work while making it.
For this example, you can tell them or write in a slide:

Don't forget to document your algorithms in paper!
It is very important when working with robots and CS in general to create a good documentation of everything you make. It can be very helpful in the future if you are required to make changes in your work.

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Make

This is an example of a worksheet to help student with the documentation. We can recreate every level in a 2D layer and give blank spaces to students to write the algorithms.

Write algorithms to help Otto to collect all the corn

Using template for documentation is good with youngest students, in the case of +12 years old students we can let them document their work in a open format of their own decision, in any case we could give some recomendations.

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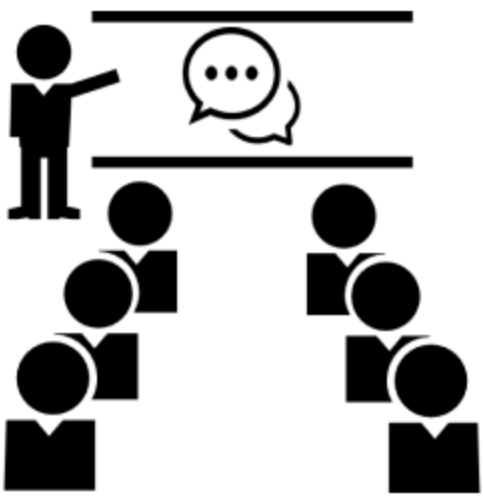
💬Debate

⏱️15% of the full class period

After students complete the project, it is time to discuss about it. Each group of **students should show** the entire class **the result of their project** explaning some key points of it during this group conversation session.

As in the previous session, in this one the **students continue to be the center of attention**, the function of the **teacher** is **organize the debate and guide the conversation** around the knowledge that students had implemented in their projects.



In this session could also **have activities like writing new documentation or doing some experiments** in order to reinforce concepts or to help the conversation during the debate to clarify some key points.

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💬Debate

Continuing with the example **Algorithms for** 🤖, in this session we can make our **students debate about the tasks performed by their robots**.

💬Debate

Let's talk about:

- How many steps did your robot walked in total? (Not count direction changes)
- How many corns did your robot collected?
- Did the algorithms have to be exactly the same to accomplish the task?
- Why is important to create the most efficient algorithms?

The conversation will reach the conclusion of **the importance of creating algorithms** that are **as efficient as possible**.

We can include a new documentation activity with a real world situation to help students to understand the importance of efficient algorithms. 👉🏼

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💬Debate

Calculating the **power consumption** is a great way to figure out the **reason to make efficient algorithms**! Better ones consume less power.

Here students understand that the **knowledge acquired** with the project **can be applied to real-world situations** such as those that were shown in the 🔗**Connect** session or even during this session (like the power consumption), but also **could be implemented in future situations** that could still not exist. How is that possible? Through the rethinking process! 💡👉🏽

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💡Rethink

⏱15% of the full class period

In this session students will start thinking in new implementations for the knowledge they applied in their projects; basically they will rethink about what they learnt and how they could use it in different ways.

The teacher could use again some worksheets to help students to build the documentation for these new ideas, or allow them create by their own.

This session could have two goals:

☝🏻Every student (not group) bring at least one new idea of how the new knowledge could be use. Not matter if the ideas of two students are too similar or the same, or if it is very unrealistic in the moment; all ideas must be welcome, and the teacher must encourage students to drop any cool idea they can imagine.

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Rethink

✌🏻Reinforce the knowledge adquired by introducing new possibilities for existing situations where applying the new knowledge could improve them.

Continuing with the example **Algorithms for** 🤖, let's see how we could work in this session:

Rethink

Mujer comiendo. / SportAdictos

Do you remember this image? Let's think about the algorithm to make that exact sandwich...

- Do you think it is an efficient algorithm to make a sandwich?

If yes, justify your answer!

If no, explain the reason & propose a most efficient algorithm to make a better sandwich.

Why do you think she prepared a so big sandwich?!

We invite students to rethink about the huge sandwich of the start and, using the new knowledge, propose a new way to build it to make it better.

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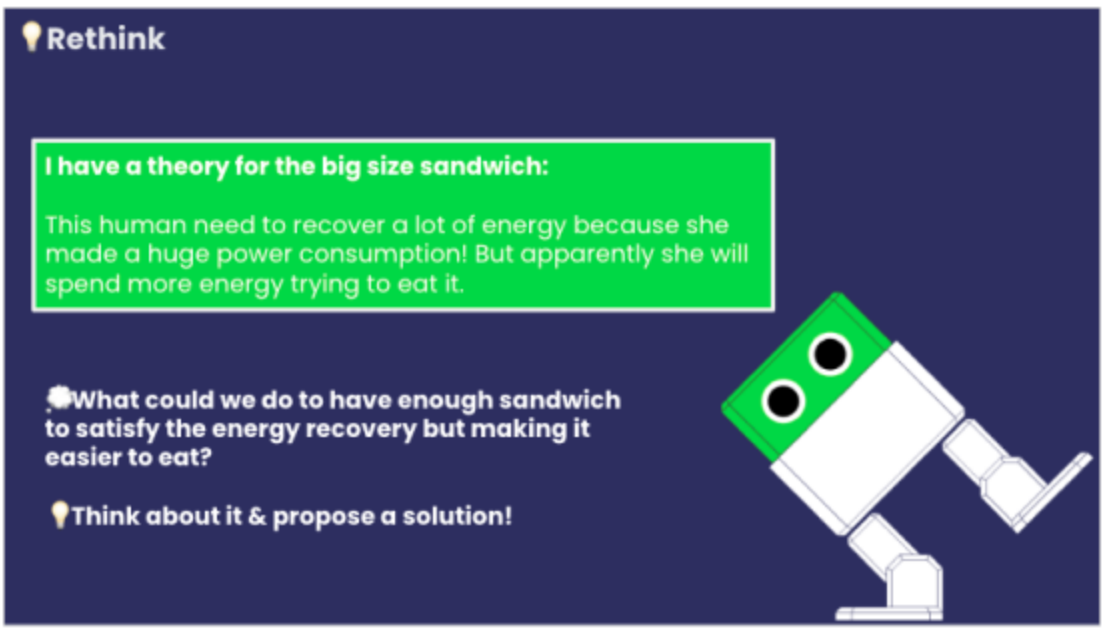
Rethink

Another way to Rethink can be by correlating things learned. Creating efficient sandwiches to eat them without a big power consumption.



Rethinking this can lead to a solution like making several smaller sandwiches to make them easier to eat.

Once this rethinking is complete, it is time to create bringing these new ideas to life... it is time to Remake!

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Remake

⏱15% of the full class period

For this session we can take some of the ideas of the 💡**Rethink** and make groups (combining two or more groups from the previous sessions) to work in these new ideas. Basically, remake the original project to adapt it to new ideas.

This session is the combination of 💡**Rethink** & 🛠**Make**

As you can figure out, this session is similar to the make one; students will put hands-on to work in a new version of the project. Again they will be required to write a documentation of their work.

In some cases this session can be optional because a matter of time or because remaking the purposed ideas are not possible in the moment.

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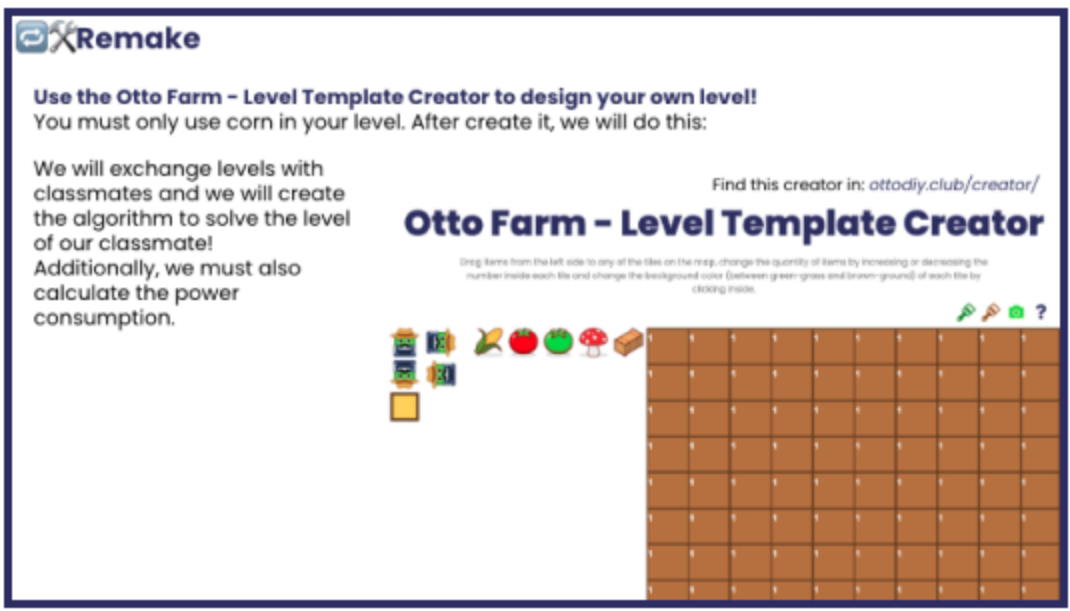
In the **Algorithms for** 🤖 example, since we are using the Otto Farming platform, we can invite our students to create templates of new levels for the platform using the creator available at ottodiy.club/creator.



In this Remake example, the students will not only create the template but they will also have to solve the level created by a classmate and apply the other knowledge acquired in the project of this class: create the most efficient algorithm possible & calculate the power consumption of the robot.