

# Mireia Castellà

CLINICAL PSYCHOLOGIST

[www.heartroboticsproject.eu](http://www.heartroboticsproject.eu)

HEART Project

(Help educators to teach through robotic tools)

no. 2021-1-PL01-KA220-ADU-000035164

Database and Guide on Educational Robotics

- **Please, introduce yourself**

I am a Clinical Psychologist and Speech Therapist. I am currently coordinating the Care Activities Plan at the Pere Mata Institute, a Psychiatric Hospital located in Reus (Tarragona).

- **Can you summarise your experience with robotics in the educational and clinical fields?**

I started working with robots about three years ago. At the Pere Mata Institute we carried out a project called SOM-HI (in English 'LET'S GO'), which was a key tool to implement a new plan of care activities. The project is based on the most current models of care such as PCP (Person-Centered Planning) or positive behavioural support. The main objective is to give the highest possible quality of life to its users. Thanks to this project, a program of activities has been designed in different areas of attention to the person: psycho-emotional, autonomous life, psycho-pedagogical and learning, body and movement, attention to the environment, leisure and free time. Some of the activities have an innovative approach, such as the use of touch screens for cognitive learning, augmentative communication programs and neuropsychological stimulation groups. This is where my most direct experience with educational robots begins.

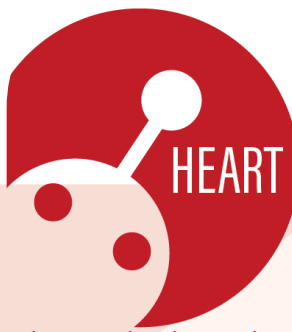
In parallel, I have also participated in a pilot experience with 12 families of children with autism spectrum disorder. From pictograms, and through the COZMO robot, children communicate with their families and improve their attentional abilities, generating responses that they would not give to humans. The level of reception by children and families has been at its highest.

- **What types of educational robot does your organisation have?**

We have manual programming robotic toys and educational robots. The types of robots with which we work are mainly aimed at the cognitive and social rehabilitation of our users.



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- **Could you give us more details about these robots?**

We have COZMO, a sensitive robot that incorporates artificial intelligence, which allows it to have a defined personality, and whose way of being changes according to what it learns from its owners. It can play with children, interact in adult conversations, snore when it sleeps, and even express a vast amount of emotions under different circumstances. The robot must be managed by software through a smartphone, which must be paired through Wi-Fi, using Anki's mobile app. And the truth is that it currently works with most modern devices that have Android and iOS operating systems.

We have BEE-BOT, an educational robot designed to develop the elementary capabilities of programming, computational thinking, concentration, spatial location and strategy. It is a "bee" robot that must be programmed to make certain movements on a grid. It has an intuitive programming language through sequences of front, back, left, right, pause and curves.

We have PLEO-RB, a robot-dinosaur with artificial intelligence and the ability to interact. Each of them has different 'genetic' characteristics: there are 32 possible combinations in the male and another 32 possible different combinations in the female, which makes some of them be more active or more sleepy, more playful, more eaten, more obedient... In addition to personal characteristics, it evolves like any pet, and has four evolutionary stages: baby, socialization stage, youth and mature age. For users it is like a pet: they have to feed it, pet it, play with it...

We have OZOBOT, a programmable robot in the shape of a sphere that fits in the palm of the hand and moves through small wheels. It has sensors on its base that allow it to read color codes, and it can follow a line marked on the floor, following the path that we trace for it. You can interpret crosses and vary their speed depending on the color of the line.



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And finally we have SPHERO-BOLT, an educational robotic ball that enhances creativity, play and learning. You can paint with it, put into practice concepts of mathematics, science, technology... The chances of learning by playing with this robot are enormous. It incorporates lighting, which is visually spectacular, especially in the dark. It has a colour matrix that can be programmed to design games through the Sphero Edu app, a highly gamified application with different levels of learning.

- **How many times have you used the robots?**

For about 3 years, we've been using robots 3 times a week.

- **How and in what contexts are these robots used?**

Within the SOM-HI project, robots are applied in the psychopedagogical area, especially in the cognitive and social fields. They are mainly used from the game.

For example, BEE-BOTs are worked with specially designed boards and pictograms. They also have different complements, such as accessories to change their appearance or push objects, pencil holders... They can be adapted according to the user's profile and their needs.

- **And what criteria is taken into account when choosing the most appropriate robot and strategy?**

The most important thing is that we cannot mix users, the members of each group belong to the same pavilion, which implies that they have similar characteristics (cognitive development, communication skills...).

Contrary to what it may seem, age is not a determining criterion, since what we are interested in is working on objectives: what purpose does it have and why do I want to work with this robot? For example, if the goal is memory maintenance, I can apply the same method to both a young person with disabilities who is beginning to have cognitive impairment detected and to an adult who has already lost mnemonic abilities.



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The groups are defined according to the objectives to be worked on.

However, it should be noted that although the playful side helps, if the design of the robot or educational material is very infantilised, it has to be adapted for an adult. The process must be facilitated so that a link is formed between the robot and the user. At this point it is essential that the professionals involved in these activities use creativity and pedagogy to create our own personalised materials.

Then there is the technological aspect: children and some young people are more used to using electronic devices and interactive elements than most adults.

- **What work/skills/activities are supported by robots?**

We work on various aspects, from logical reasoning, attention span and memory to social skills. In addition, the game is used as a very attractive and motivating social interaction tool.

For example, some of our users have serious communication problems with others, and they usually show altered and avoidant behaviour. With the help of BEE-BOTS, these people are able to establish and fully respect others' turns. They even become friendly with peers and help them. The playful format is very effective in these contexts.

We also work on graphomotor skills and enhance literacy. It means that the robot has to move to the corresponding letters to form a word and every time it stops at a letter, it has to be written. In these cases, the basic function of the robot is motivational.

Another very common activity is the memory of family names, for adults with neurocognitive impairment: a mural with photos of places and people known to the user is conceived, and the robot moves through the photos, as the person remembers.

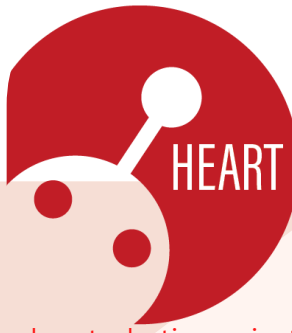
Other highly developed skills in these contexts are gaze tracking, and impulse control.

Also the motor, for example with the SPHERO-BOLT: one controls the robot while another has to dodge it (running, lifting a leg, jumping...).

With OZOBOT we can work on fine motor skills: patients learn slogans, draw with coloured lines and the robot must follow the paths drawn. Visual abilities also come into play here.



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- **If not confidential, who provided your organisation with this robot?**

We collaborate with the Institute of Robotics for Dependence (Sitges, Barcelona), which keeps us informed about the latest developments in the field of robotics applied to therapies and rehabilitation. The robots are purchased directly by the Villablanca Foundation, to which our center belongs.

- **If not confidential, what were the implementation costs?**

COZMO cost about €300; each BEE-BOT €80; PLEO-RB almost €800; OZOBOT about €150; SPHERO-BOLT nearly €200.

- **How long did they need for the development of the educational scenario?**

To devise the educational scenario, time is something very relative. In addition, it has to be modified as it is carried out...

Perhaps it is more useful to take as a reference the time that usually takes users to understand the operation of a scenario/activity: on average we could say that in about a month (about 4 sessions), a person already understands the dynamics and you can start to achieve results.

- **Have you had any problems with the robot?**

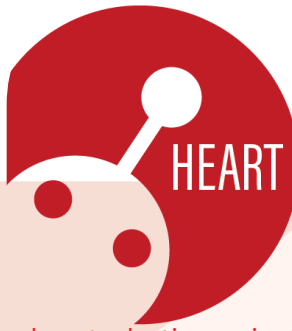
Mainly with suppliers. There are no suppliers in our country, most are in Great Britain or Holland... Sometimes there are shipments that arrive with the defective product, or with some parts in poor condition (usually spare parts: battery, power cables, adapters...).

Other times we have the problem directly with the distributors, mainly with the delay in shipments.

They are very recent products, this implies that some brands do not survive and remove some products from the market (as it happened at the beginning with COZMO). This makes it difficult for us to acquire accessories or spare parts.



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- **How was the issue resolved?**

With patience and insistence. Some problem still persists, for example, the robot-dinosaur (PLEO-RB) we cannot use it because they sent us some defective batteries and now we are waiting for a new shipment.

What we have learned is that we have to try to work with experienced suppliers.

- **What consequences did it have on your daily functioning?**

It's a step backwards in the case of some patients. For example, in those who had hardly any reactions (catatonia, paralysis...) and who managed to generate responses with the robots.

In addition, "new" problems also appear: some people establish a link with the robot which, if broken suddenly, can have negative behavioural consequences.

- **Are there tutorials for the use of the robot?**

Yes, on the websites of the manufacturers there are videos, and on youtube you can also find tutorials.

- **Are the materials for a non-expert audience?**

Yes, although you have to be clear about the manuals. You have to have some very basic notions of robotics if you are going to have a minimum of contact with these robots, but it is something that anyone can acquire in a very short time.

- **Does the robot need an additional kit of components to fully operate in the chosen area?**

No, although complements are sold to enrich the scenarios and activities.

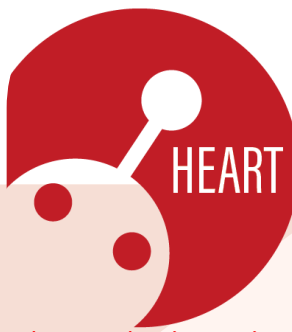
- **Do you know any other centers where they work with robots?**

The Institute of Robotics for Dependency in Sitges (Barcelona) and some special education schools also use them.



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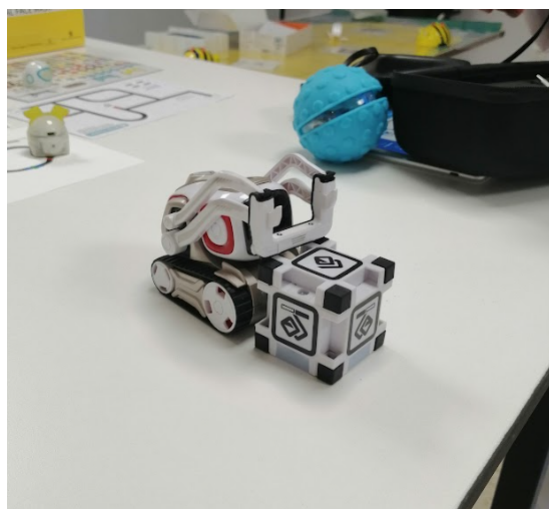
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- Anything else you want to share with us?

I think one of the most important aspects when working with educational robots is creativity. It is not so much the performance of the robot or what it was made for, but all the possibilities they offer. You have to take advantage of them. It is necessary to have imagination and a very open mind.



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