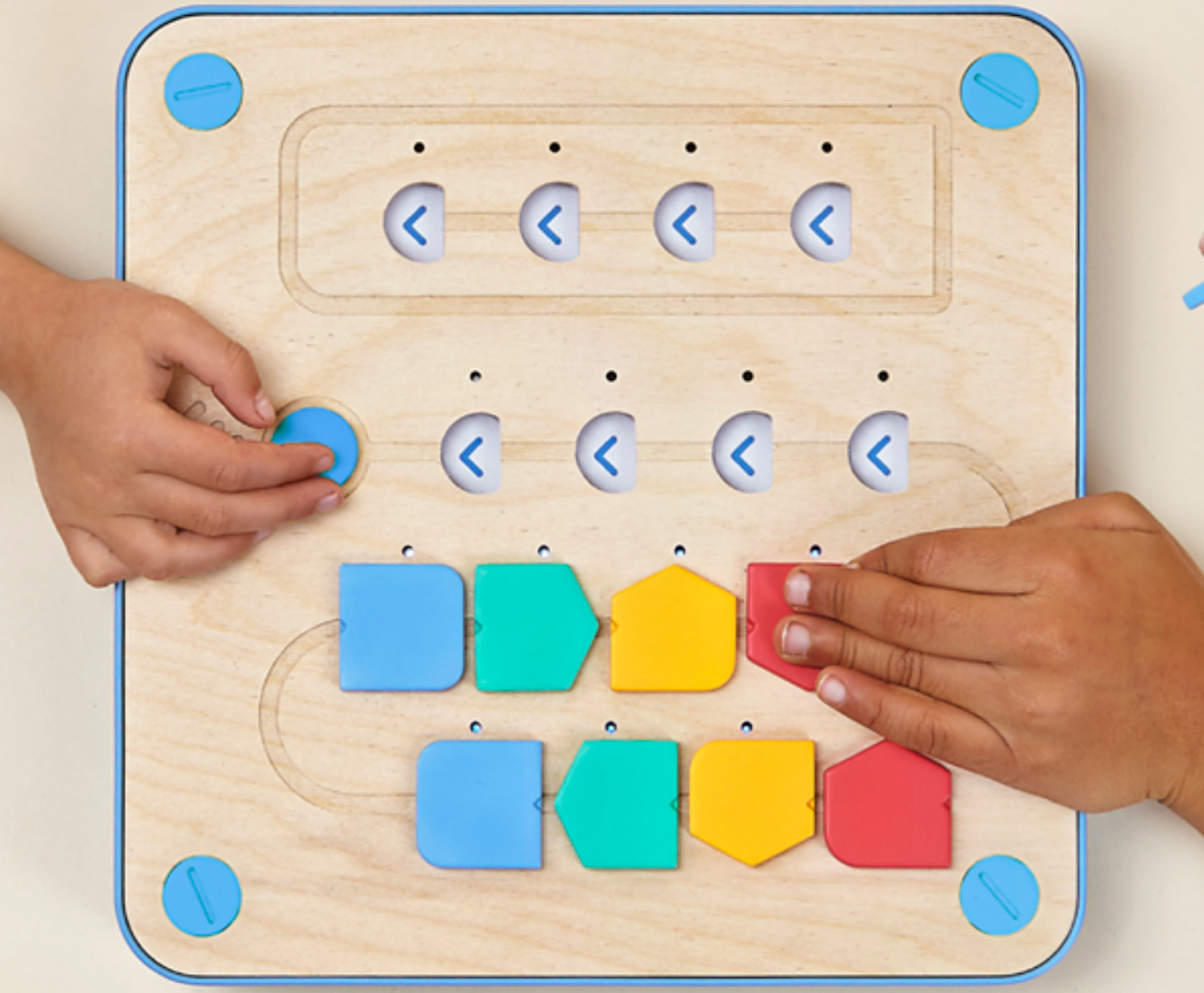
PRIMO

Cubetto teacher's guide



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2016

Hello!

The Cubetto Playset is a Montessori inspired coding toy that allows children ages 3 to 6 to program a friendly wooden robot without screens or literacy, and it is powered by a programming language you can touch.

What teachers love most is its versatility in cross curricular applications. It fosters student learning in key areas like Social-Emotional, Creative Thinking, STEM, and Common Core.

The activities contained in this guide were created by educators for educators. New technology can sometimes be overwhelming to understand and adopt. We want to make it simple for you to integrate the Cubetto Playset and its tangible programming language into your teaching.

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Getting started

Where can I use Cubetto?

Here are examples of environments and programs that use Cubetto to introduce computational thinking and programming through hands on play, storytelling and adventure:

- Montessori Kindergarten
- Early learning centres
- Elementary schools
- Homeschooling
- Special needs classrooms and inclusion programs
- Afterschool programs
- Technology clubs
- STEM curriculum
- Gifted programs
- Public Libraries and Community Centers
- Maker Spaces
- Tutoring
- Technology camps

Setting up your playset?

You'll find instructions inside each playset that make setup fast and easy.

For more information and documentation, you can also visit:
docs.primotoys.com/usermanual

Purchase Cubetto

To buy a Cubetto Playset, visit primotoys.com.

For bulk order discounts contact:
edu@primotoys.com.

Help and Support

We're here to help, and you can contact us anytime.

General Support:
support@primotoys.com

Education or volume purchase:
edu@primotoys.com

Research and value

The Cubetto Playset is a Logo Turtle inspired, Montessori led programming system. It is powered by a coding language you can touch, and an interface specifically designed for ages 3 to 6.

This age-group is ideal to begin a child's journey in computer programming, but one should not have to do so at the expense of important educational areas traditionally learned in hands on play.

LOGO (not Lego), was a milestone in coding education. The goal of Seymour Papert, who created LOGO at MIT in the 1960's, was not just to teach programming, but also to help children discover their own personal way of solving problems.

Cubetto's coding blocks can be considered an extreme simplification of LOGO. We limited the instructions to their purest form, avoiding any kind of textual or numerical language.

The material choice is important: the shell of the interface, and of Cubetto are made of wood, a natural material. During development, observations were conducted in traditional Swiss kindergartens, where toys and games made of wood are the most loved by children. Wooden toys are durable, they have memory, they collect history through marks and scratches, signs of past love and usage. Wood was also chosen as a material because of the stark contrast it creates with technology, hiding the complexity of the circuit boards beneath the shell.

Programming

The tangible blocks have the potential and scalability of any real procedural programming language, and children can learn and play with a variety of core programming concepts.

Algorithms

Algorithms are sets of precise instructions that form a program. Cubetto's blocks are a physical representation of an instruction that combine to create a program.

The queue

Instructions in programs are executed following a precise order. On Cubetto's board, they are put together following a line, also a physical representation of the queue.

Debugging

The instructions are laid on the board. Fixing mistakes is as easy as swapping a block if Cubetto doesn't arrive where he needs to. This is called debugging.

Recursions

Create a subroutine by "packaging" a sequence in the function line, and call it in the queue with a blue block when you need it.

Learning in other key areas

The tactile and collaborative nature of Cubetto makes it an extremely versatile tool for the classroom. Cubetto fosters learning in key developmental areas that go beyond programming. Using Cubetto in the classroom can help with these specific outcomes:

Communication

Children practice listening through a range of stories and narratives in relation to Cubetto, accurately anticipating key events and respond with relevant comments, questions or actions. They also develop their own narratives and explanations.

Physical exercise

Children master control and coordination in large and small movements around the playset. They negotiate the placement of obstacles around the world map, and place blocks on our tangible interface.

Social-Emotional

Children become confident by trying new, open ended activities that remove “wrong” outcomes, and easily encourage group work. The open nature of the maps allows them to choose the resources they need for their play session.

Mathematics

Children add and subtract blocks from a sequence. They solve problems, including doubling, halving and sharing to get Cubetto from A to B. They discuss size, identify shapes and patterns, distance, position, and time to solve problems.

Logical reasoning

The blocks allow children to create and debug simple programs with their hands. They use technology purposefully to create, organise, store, manipulate and retrieve meaningful sequences.

Setting up the play session

The goal is to get children to create programs for Cubetto by arranging sequences of instruction.

The more time spent playing with Cubetto, the more children develop computational thinking skills; measurable in fact by observing them while creating longer sequences of instruction to solve more complex problems.

The speed with which a child can progress through “mission difficulty” varies from child to child, but it is always important not to skip the introductory steps, no matter how fast a child goes through them.

Introducing Cubetto

Introduce Cubetto as a friendly robot that children can program. Children should be told that Cubetto cannot think for himself, and can only move as programmed by the child, just like any other machine.

If in a group setting, sit children in a circle, and allow them to pass Cubetto around to one another, saying hello or acknowledging the presence of the object.

Doing so forms a bond of sorts with Cubetto, in the same way they would with a stuffed animal, or a toy, and solving problems through narratives later on is more important, and more engaged.

Introducing the Board

Introduce the Board as a sort of remote control that children can use to send instructions to Cubetto. Without the Board, there is no way of sending Cubetto his instructions.

It is important for children to understand Cubetto is only able to move with a human's command. This is not only empowering, but also key to understanding computing.

Encourage children to also explain what other objects in their homes and lives function with a similar paradigm. A television needs a human to change its channels for example, or a washing machine needs a human to select its settings.

All of these examples, like Cubetto, are machines that need human programming to work and do their job.

Introducing the Blocks

Introducing the instruction blocks as the directions Cubetto follows when inserted in the Board and sent by pressing the action button.

Different blocks mean different instructions, and it is important that each block is recognised as an unambiguous and distinct instructions.

These blocks are what make up Cubetto's hands-on coding language, and are key in the learning of computational thinking. When each block is inserted in the Board, a child should be encouraged to predict what Cubetto will execute once the command is sent.

This is key in understanding concepts like program design, and prediction, and it helps them develop abstraction.

Suggested activities - part 1

Action causality

The aim of the first session is to introduce the simple notion that sending a command to Cubetto will result in an action. Take the Green Block (Forward), and have a child insert it in the first slot in the board.

Then have the child press the big blue button on the interface board (Go), and observe Cubetto executing the command. Make sure the child clearly associates the colour of the block with the action performed.

Unambiguous instructions

Repeat the previous step with each directional block (except the blue function block), until the child can confidently recognise each block as a distinct and unambiguous instruction.

This is an important step into understanding how a meaningful chain of commands, or a sequence if you will, can be later created to solve a specific problem.

The first challenge

Unfold the map, and place Cubetto on a square. Ask the child to create a program that will get Cubetto to the square directly in front of it. The child should be able to reason and tell which single instruction will allow Cubetto to reach his destination.

Let the child insert the block in the first slot of the Interface Board, and press the action button. Don't worry if the wrong block was selected. Just reset Cubetto's position, and encourage the child to reason his/her choice, and try new options.

Suggested activities - part 2

The queue

This time set the arrival point two squares ahead of Cubetto, then ask the child to create a program with two blocks that will get Cubetto to his house. Let the child reason and create the sequence that will drive Cubetto to his destination.

Let the child insert the blocks in the first two slots of the Interface Board, and press the action button. Don’t worry if the wrong blocks were selected. Just reset Cubetto’s position, and encourage the child to reason his/her choice, and try new options.

Three block sequence

This time set the arrival point one square ahead of Cubetto, and one square to his left (or right). Ask the child to create a program that will get Cubetto to his house. Let the child reason and create the sequence that drives Cubetto to his destination.

Let the child insert the blocks in the first three slots of the Interface Board, and press the action button. Don't worry if the wrong blocks were selected. Just reset Cubetto's position, and encourage the child to reason his/her choice, and try new options.

Debugging

Set the arrival point one square ahead of Cubetto, and one square to his left (or right). This time, provide the solution to the problem, deliberately inserting a wrong turn in the sequence. Ask the child to predict the wrong program, and independently reason the wrong outcome, and allow them to press the Go button to validate their assumption.

Once the child is certain the provided sequence was wrong, either by reasoning or by validation, allow them to swap the wrong command for a correct one, thus debugging the program.

Suggested activities - part 3

Introducing the function

After the child is familiar with the basic blocks, and the idea of an algorithm, it is time to introduce the function block. To explain how it works, you can use the "../pack" metaphor, explaining that it is possible to pack more instructions inside a blue block.

To show this, first place two red blocks in the main sequence and press the Go button. This will move Cubetto forward by two grid tiles on the map. Now clear the interface board, and place the two forward blocks in the function line (The last line in the board) instead, while placing a blue block in the main sequence. Let the children observe that Cubetto can perform the same actions with two different sequences.

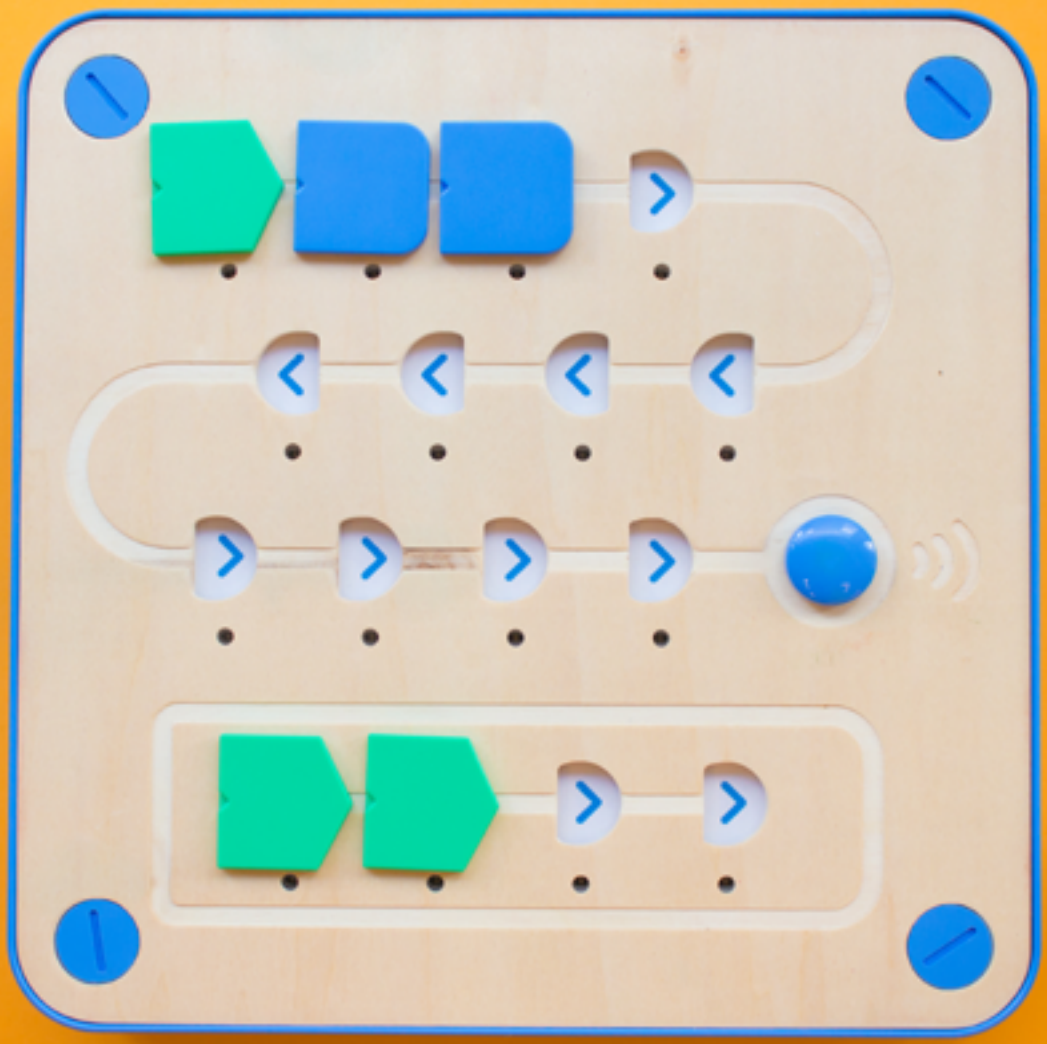
Leaving the same sequence in the function line, place two blue blocks in the main sequence, and let the children observe how two blue blocks cause Cubetto to repeat the function twice.

Solving problems with the function

Unfold the map, place Cubetto on the compass, and give the child only the following blocks: 3x Green blocks, and 2x Blue blocks (Function). Ask the child to create a program that will get Cubetto 5 squares ahead of him.

Since there are not enough forward blocks to make this happen, the child should be able to reason that a function should be created in order to complete the project.

Let the child create the right sequence, including a function, and press the Go button. If the sequence is wrong, just reset Cubetto's position, and encourage the child to reason his/her choice, and try new options.



Community and resources

Your classroom, your Cubetto

The best judge of what makes a child tick is you. You know your classroom, your environment and your group, which is why we only provide a framework for progression instead of a ready made solution. It's your story, your classroom, your Cubetto.

Support with your grant

Our education team is always happy to help with quotes and information that can facilitate or expedite your grant application and approval. We understand this is a big part of financing adequate resources in the classroom, and we're here to help. For support, write to us at edu@primotoys.com

Resources and lesson plans

Join our free resource centre, where educators from all continents and backgrounds create lesson plans and additional classroom material for you to implement and use in your classroom. Share your experiences, get ideas and inspiration, and upload your own content. Our resource centre is currently in private Beta, you can join here.

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