LEGO® Education WeDo 2.0

Computational Thinking

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WHY
1. Enhancing the WeDo 2.0 experience

HOW
2. Coding is more than code

WHAT
3. Product & Launch details
4. Positioning, messaging & storytelling

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1. Enhancing the WeDo 2.0 experience

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Why adding Computational Thinking to the WeDo solution

- Computational Thinking - with the use of coding - enables WeDo 2.0 to be even more relevant within STEM.

- Using the momentum and acceleration of coding, WeDo 2.0 want's to enhance the value proposition to leverage this mainstream trend through Computational Thinking.

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Computational Thinking supports the 2016 launch

WeDo 2.0 make Science come to life...

...supporting elementary teachers in developing students' practices within Science, Technology and Engineering (STEM).

...solving problems through investigation, modeling, designing and computational thinking – through building and coding.

Build – Code – Learn

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WeDo makes Science come to life in 3 unique ways

Investigate

- Predict

- Test

- Find answers

Model

- Display ideas

- Explain & describe

- Discover limita-
tions

Design

- Create prototypes

- Test

- Evaluate

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Now also making Science come to life using the bricks and coding

Think 'computationally'

- Decomposition
- Generalization
- Define algorithms
- Evaluation
- Abstraction

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Can you cook a dinner?.. or do you know how to cook a dinner

Computational Thinking	Cooking	WeDo 2.0 Example: 'Moon Base'
Decomposing	Identifying the components; Appetizer, main course, wine, dessert.	Simplifying the problem by identifying subsets if movements along a path.
Generalizing	Techniques; All vegetables in same size. What to go in the oven (on same temperature).	Finding patterns to explain how the robot can turn left and right.
Algorithmic Thinking *Coding*	Putting together the ingredients in the right order. Follow the recipe.	Creating a program to collect moon base modules.
Evaluation	How do the components fit together. Test tasting.	Improving the solution until the robot can complete its task with some precision.
Abstraction	Present the meal on a menu.	Explaining the solution with the right level of detail.

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2. Coding is more than code

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The angle to coding comes from various education leaders

Harvard

Supporting young people's development as computational thinkers – individuals who can draw on computational concepts, practices, and perspectives in all aspects of live across disciplines and contexts.*

BBC

Computational Thinking allow us to **take a complex problem, understand what the problem is and develop possible solutions**. We can then present these solutions in a way that a computer, a human or both are able to understand.**

Center for Computational Thinking at Carnegie Mellon University, Pittsburgh

Computational Thinking is **a way of solving problems**, designing systems, and understanding human behavior that draws on concepts fundamental to computer science. The solutions are represented in a form that can be effectively carried out by an information processing agent' (e.g. coding)

Google

https://www.youtube.com/watch?v=sxUJKN6TJOI

Code.org

https://code.org/curriculum/course3/1/Teacher

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Computational Thinking makes the link to STEM

The term **Computational Thinking** comes predominantly from the work of Jeanette Wing in recent years but stems from the early work of Seymour Papert who himself was a student of Jean Piaget.

Jeanette Wing – "*Computational Thinking is a kind of analytical thinking*"

- It shares with **mathematical** thinking in the general ways in which we might approach solving a problem.

- It shares with **engineering** thinking in the general ways in which we might approach designing and evaluating a large, complex system that operates within the constraints of the real world.

- It shares with **scientific** thinking in the general ways in which we might approach understanding computability, intelligence, the mind and human behavior.

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Computational Thinking links to STEM

STEM Disciplines

Science, Technology, Engineering, Mathematics, Computer Science

Develop a mindset and life long set of practices

1. Ask questions and solve problems.
2. Use models.
3. Design prototypes.
4. Investigate.
5. Analyze and interpret data.
6. Use computational thinking.

    a. Decompose
    b. Abstract
    c. Think algorythmically (code)
    d. Evaluate
    e. Generalise

7. Engage in argument from evidence.
8. Obtain, evaluate, and communicate information.

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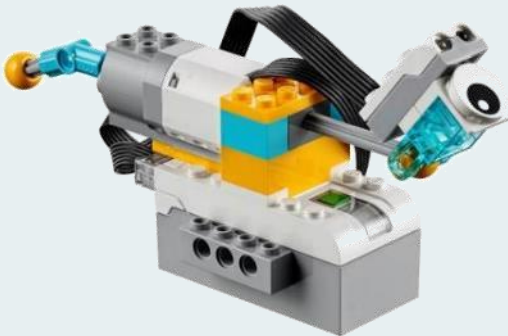
Computational Thinking can be found in curriculums

NGSS

Practice 5: Using Mathematics and Computational Thinking students are also expected to engage in Computational Thinking, which **involves strategies for organizing and searching data, creating sequences of steps called algorithms**, and using and developing new simulations of natural and designed systems.*

US - CSTA

We believe that Computational Thinking is **a problem solving methodology** that expands the realm of computer science into all disciplines, providing a distinct means of analyzing and developing solutions to problems that can be solved computationally. Computational Thinking is a core element of the broader discipline of computer science**

UK - Computing Curriculum

High-quality computing education equips pupils to use Computational Thinking and creativity **to understand and change the world**.***

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Computational Thinking
makes coding relevant in the STEM class

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What is Computational Thinking?

Computational Thinking is a set of skills that can be described in different ways. The skills that are most commonly referred to is:

Decomposition

The ability to simplify a problem into smaller parts to ease the process of finding a solution.

Generalization (pattern recognition)

The ability to recognize the parts of a known task, or have been seen somewhere else.

Algorithmic Thinking (Coding)

The ability to create an ordered series of steps (process) for solving a problem.

Evaluating

The ability to verity whether or not a prototype works as intended, and if not, the ability to identify what

needs to be improved.

Abstraction

The ability to explain a problem or a solution by removing unimportant details.

A new field with many terms and definitions

Computer Science

Computer science is the scientific and practical approach to computation and its applications. It's an area of learning that encompasses many elements of computing, including coding and computational thinking. Computer Science is a subject. An elementary teacher say*: **"...**_Most associated this with a class or course, especially at university level - eg something you can have a master in"_.

Coding

Coding is what makes it possible for us to create computer software, apps and websites. In LEGO terms, we use Coding to create programs that physically control and manipulate the models we create. Coding is an activity. An elementary teacher say: "_A buzzword, heard often, think it must be relevant because it's popular but aren't 100% sure how it's relevant to teaching"_.

Computational Thinking

Computational thinking is the fundamental skill of analytical thinking for everyone, not just for computer scientists. It's about solving problems, designing systems, and understanding human behavior, by drawing on the concepts fundamental to computer science. Computational Thinking is a skill. An elementary teacher say: "V_ery relevant, ties to mathematics and science standards, but must admit it can be hard to define"_.
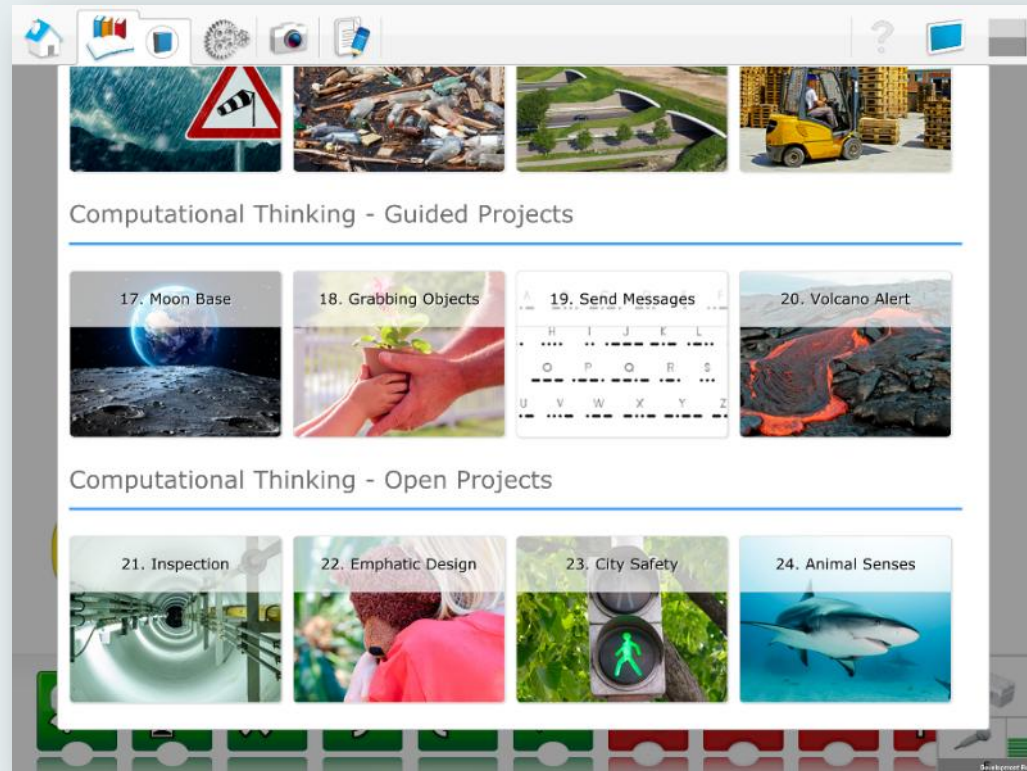
3. Product & Launch details

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WeDo 2.0 Computational Thinking - Meet Cody and Luna

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New projects! 4 Guided and 4 Open

Guided Projects - all about problem solving

Moon Base

This project is about designing a solution in which a robot would be able to assemble a base on the moon.

Grabbing Objects

This project is about designing a solution for a prosthetic hand that is able to move small objects around.

Sending Messages

This project is about designing a solution for exchanging information using a system of signals organized in patterns.

Volcano Alert

This project is about designing a device for improving the monitoring of volcanic activity in order to guide scientific exploration.

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Open Computational Thinking projects

Suggested base models
(to start from)

Inspiration models
(no building instruction)

Inspection
This project is about designing a solution in which a robot is able to inspect narrow spaces, guiding its motion with sensors.

Emotional Design
This project is about designing a solution in which a robot can display positive emotions when interacting with people.
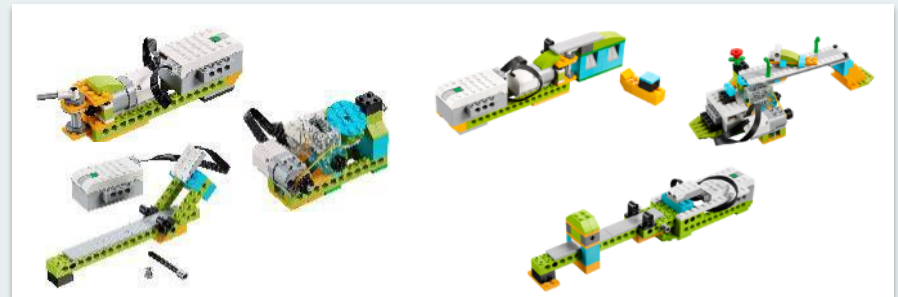
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Open Computational Thinking projects

Suggested base models
(to start from)

Inspiration models
(no building instruction)

City Safety
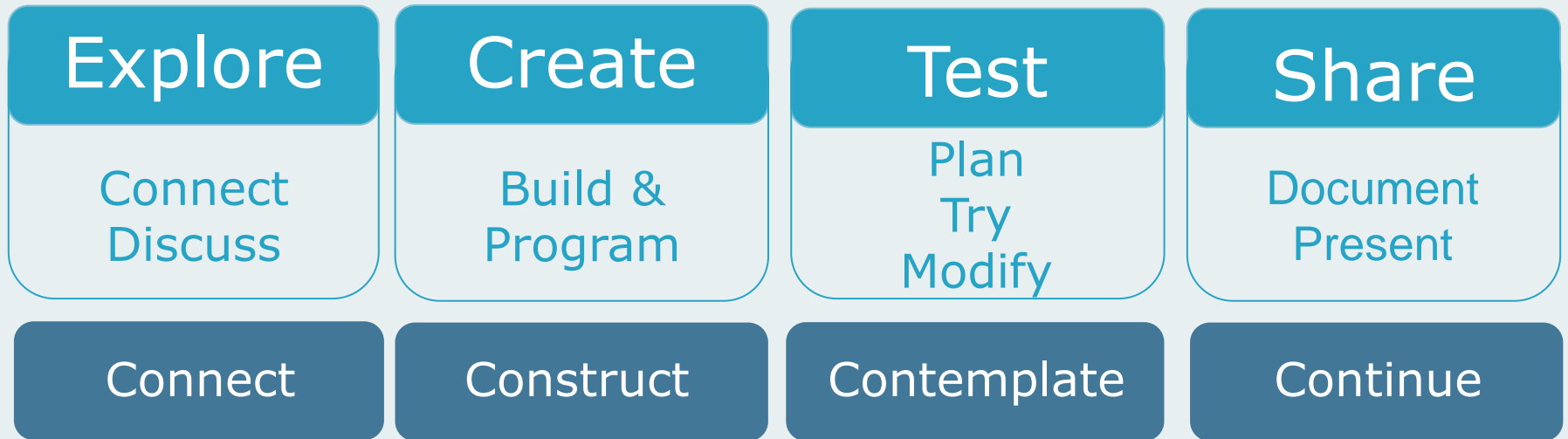This project is about designing a solution to improve safety in a city.
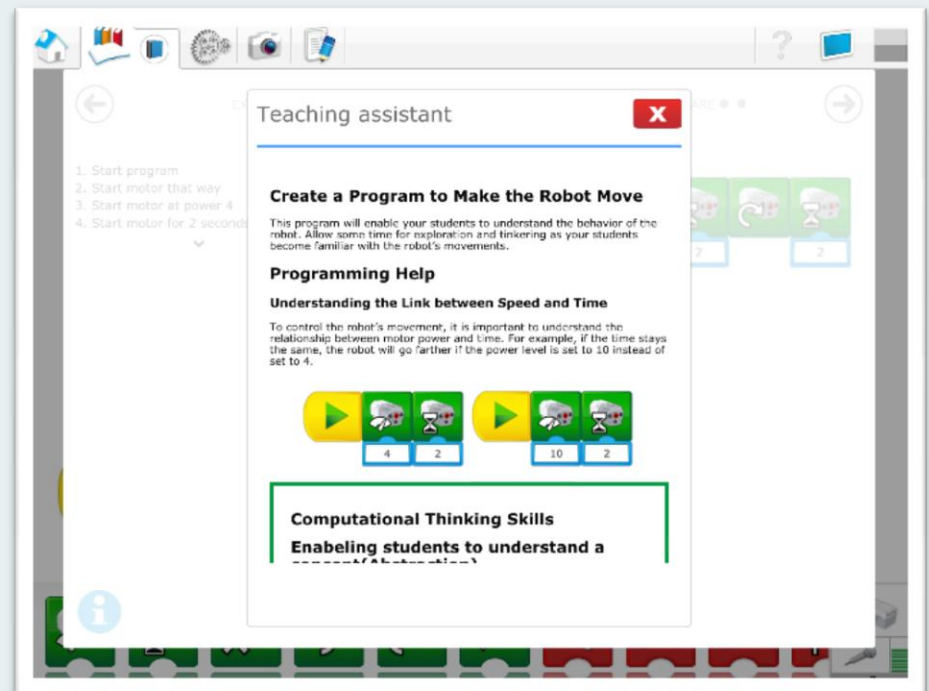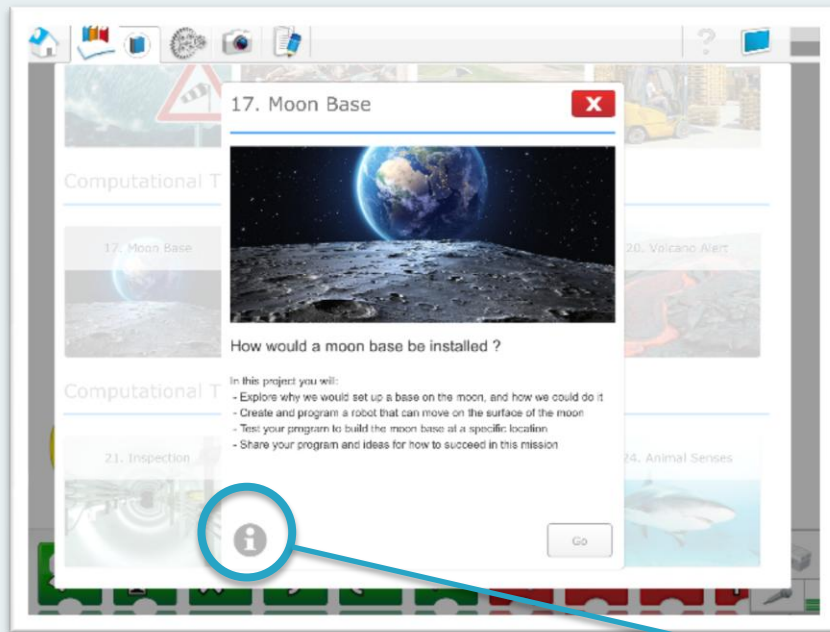

Animal Senses
This project is about modeling how animals use their senses to interact with their environment.

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New projects with a 4 step process

Explore	Create	Test	Share
Connect Discuss	Build & Program	Plan Try Modify	Document Present

| Connect | Construct | Contemplate | Continue |

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# New projects with a new 'teacher assistant' feature

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Updated program 'mirroring' the model libary
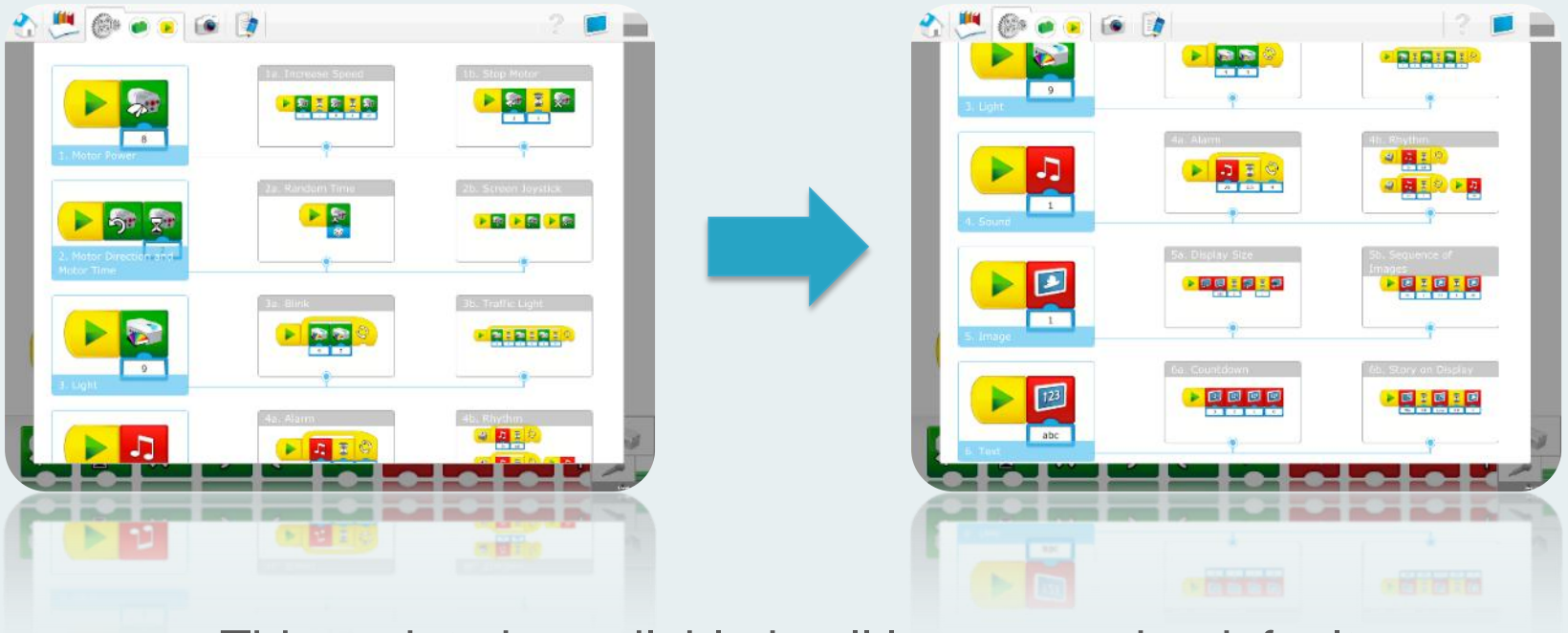
This update is available in all languages by default.

Important facts and changes

- The updates will be available in July on all operating systems iOS, Chromebook, Android, Windows,Mac

- The new projects incl. teacher assistant is CONTENT UPDATES and is available from July 2017 in UK, US, AUS, GER, FR, ES, CH, JP, KO & NL

- The program library update is a SOFTWARE UPDATE and is be available in all languages

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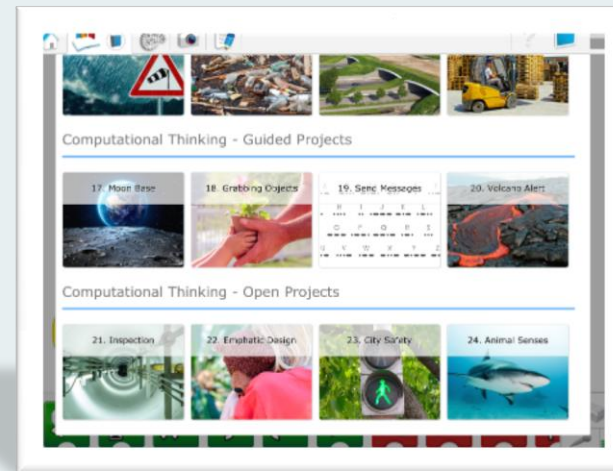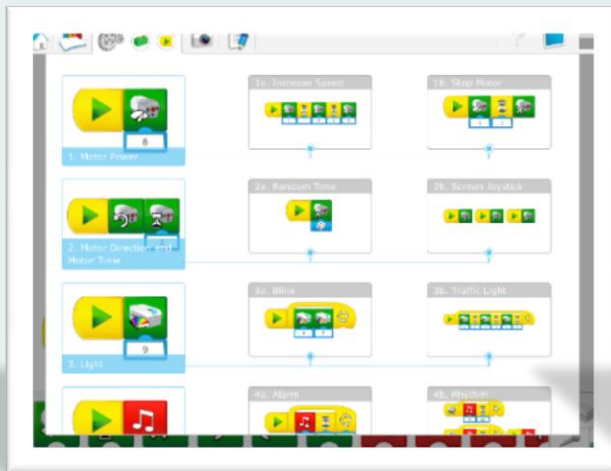
4. Positioning, messaging & storytelling

Positioning, Messaging & Storytelling

- We believe that coding is much more than just code…it is Computational Thinking.
- We want to give teachers and students the tools they need to implement coding in the classroom through the use of computational thinking.
- This further consolidates the WeDo 2.0 positioning as a trusted classroom solution provider in STEM curriculum by making science come to life.
- To "Code" should always be seen in the context of "Build" and "Learn". The hands-on "Build" experience with the familiar LEGO bricks is a unique differentiator and our classroom and curriculum relevance completes the "Learn" experience.

Value proposition
WeDo 2.0 makes science come to life

Positioning Statement
WeDo 2.0 makes coding come to life through computational thinking.

Strategic Messaging
Coding is more than code…it is computational thinking.

Build – Code – Learn

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