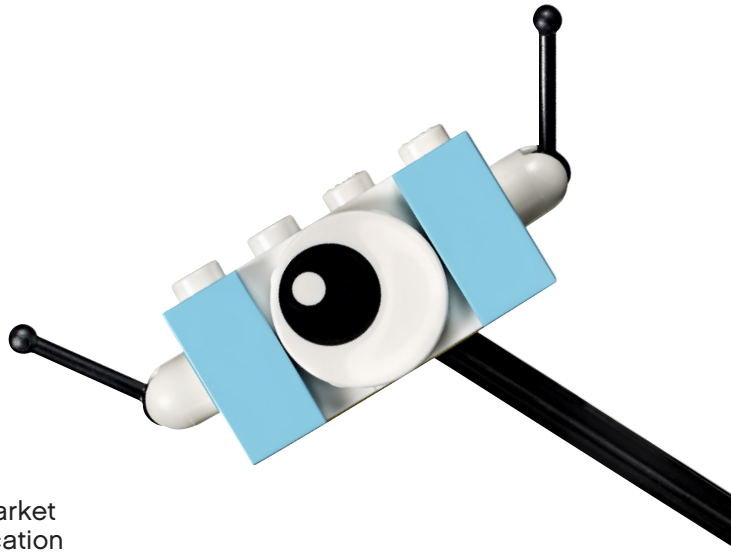
WeDo 2.0

MAKER Activities – Primary School



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LEGO education

Introduction to the Maker Lessons

The LEGO® Education WeDo 2.0 Maker lessons have been developed to engage and motivate primary school pupils, piquing their interest in learning about design, engineering and coding using motorised models and simple programming.

Each lesson provides an initial brief as a starting point. The open-ended prompts allow for unlimited answers and enable pupils to express a wide range of creative solutions as they sketch, build and test prototypes of the designs that they create.

The teacher's role in these lessons is to provide pupils with the tools and necessary freedom to connect with and define a problem, make a solution and share what they have made.

Use your creativity to adapt these lessons to suit the needs of your pupils.

> *'The role of the teacher is to create the conditions for invention rather than provide ready-made knowledge.'*
>
> *– Seymour Papert*

Classroom Management Tips

Required Materials
- LEGO® Education WeDo 2.0 Core Set
- Lesson plan
- Pupil Worksheet for each lesson
- Modelling materials already available in your classroom

How much time do you need?
Each lesson is designed to take 90 minutes. If you work in shorter class periods you can break this down into two 45 minute sessions.

Preparation
It is important to establish work groups for your pupils. Groups of two work well. Ensure that each pupil has a copy of the Pupil Worksheet for recording their design process. Alternatively, they can use their own preferred method for recording their design journey. They will also need the LEGO Education WeDo 2.0 Core Set (one set for every two pupils is recommended).

Prior Learning
Before beginning these Maker lessons, it is recommended that the pupils complete at least one of the Getting Started lessons with Milo the Science Rover. They should also spend some time experimenting and playing with the WeDo 2.0 LEGO® bricks and programming app. The Getting Started lessons, which can be found within the WeDo 2.0 software, are designed to build pupils' competence and confidence in building and coding.

However, if you prefer a more open-ended, explorative approach, you can start out with this lesson and allow your pupils to find help on their own by exploring the WeDo 2.0 Model and Program Libraries.

The LEGO® Education Maker (Design) Process

Find a Problem
It is important for pupils to define a real problem to solve or to find a new design opportunity from the start. The 'Connect' images are provided as inspiration to help pupils as they begin thinking about their own design solutions.

Brainstorm
Brainstorming is an active part of making. Some pupils will find it easier to explore their thoughts through tinkering (i.e., hands-on experimentation) with the LEGO bricks and others will prefer to record sketches and notes. Group work is essential, but it is important to allow time for pupils to work alone before sharing their ideas with their group.

Choose the Best Idea
Discussing and reaching an agreement about the best solution to build can involve a lot of negotiation and may require different techniques that are dependent upon your pupils' skills. For example:
- Some pupils draw well.
- Others may build part of a model and then describe what they mean.
- Other pupils may be good at describing a strategy.

Encourage a culture in which pupils can share anything, no matter how abstract it might sound. Be active during this phase and ensure that pupils choose achievable ideas.

It is important for pupils to set clear design criteria. Once the solution to the problem has been made, they will return to these criteria, which will then form the basis for testing how well the solution works.

Design criteria example:
The design must…
The design should…
The design could…

Make the Idea
Pupils must use the LEGO® set to make one of their ideas, and they can also use other materials if necessary. If they are finding it difficult to build their idea, encourage them to break problems down into smaller parts. Explain that they do not have to come up with the whole solution from the start. Remind them that this process is iterative and that they must test, analyse and revise their idea as they go.

Using this Maker process does not mean that you are following an inflexible set of steps. Instead, think of it as a set of practices. For example, brainstorming may be prominent at the beginning of the process. However, pupils may also need to brainstorm ideas when they are trying to figure out ways to improve their idea or when they have a bad test result and must change a feature of their design.

Evaluate What You Have Made
In order to help pupils to develop their critical thinking and communication skills, you may wish to have pupils from one group observe and critique another group's solution. Peer review and formative feedback helps both the pupils giving and the pupils receiving the feedback to improve their work.

Present Your Model
The Pupil Worksheet is helpful for basic documentation of the lesson. The pupils can also refer to it when presenting their work in front of the class. You may also wish to use the Pupil Worksheet as a portfolio for performance evaluations or for the pupils' self-evaluation.

Assessment

Where can I find the assessment materials?
Assessment materials are provided at the end of the Pupil Worksheets for the first three projects.

What learning goals are assessed?
Pupils use the Maker self-assessment rubric to evaluate their design work. Each rubric includes four levels of achievement. The intention is to help them to reflect on what they have done well and what they could have done better. Each rubric can be linked to engineering-related learning goals.

Using these rubrics, pupils can assess themselves using the 'Four Bricks Scale' in which the biggest brick represents the highest rating. In certain situations, you might consider asking your pupils to assess themselves using only two of the four bricks.

Emerging
The pupil is at the beginning stages of their development in terms of content knowledge, ability to understand and apply content, and/or demonstrate coherent thoughts about a given topic.

Developing
The pupil is able to present basic knowledge only (e.g. vocabulary) and cannot yet apply content knowledge or demonstrate comprehension of the concepts being presented.

Proficient
The pupil has concrete levels of comprehension of the content and concepts, and can adequately demonstrate the topics, content or concepts that are being taught. The pupil lacks the ability to discuss and apply these concepts outside of the required assignment.

Accomplished
The pupil can take concepts and ideas to the next level, apply these concepts to other situations, and synthesise, apply, and extend their knowledge to discussions that include extensions of ideas.

NGSS Science Standards:

Science and Engineering Practices
3-5-ETS1.1, 3-5-ETS1-2, 3-5-ETS1-3

Disciplinary Core Ideas
ETS1.A, (3-5-ETS1-1)
ETS1.B, (3-5-ETS1-2), (3-5-ETS1-3)
ETS1.C, (3-5-ETS1-3)

Common Core State Standards
ELA/Literacy
RI.5.1, RI.5.7, W.5.8

Mathematics
MP.2, MP.4

Share It

We encourage you to share your pupils' brilliant projects on the appropriate social media platforms using the hashtag #LEGOMaker.

#LEGOMAKER

The Maker Lessons
Start your Maker journey with the following three lessons:
- Make a sound machine
- Make a dancing robot
- Make a life hack