

early years & primary STEM bulletin

Ideas and
inspiration for
primary teachers
and early years
staff

In this edition:



Creating usable outdoor spaces at SSERC HQ

An example of how outdoor learning can be used to support an organisation's corporate social responsibility.



STEM Ambassadors information session

Find out more about how SSERC, as a STEM Ambassador Delivery Partner, can support your centre.



The risks of using websites and social media for STEM activities

Find out why the internet is not always your friend when planning STEM activities for your learners.



Great Science Share for Schools - sustainable science

Find out more about the 2024 Great Science Share for Schools theme: Sustainable Science.



Engineering Educates

An overview of the Engineering Educates programme.



Young STEM Leader Week

Find out how you and your learners can be involved in the Young STEM Leader Week, 2023.

And other articles by external partners & organisations

Creating usable outdoor spaces at SSERC HQ

Corporate Social Responsibility (CSR) for SSERC means that we take account of the impact of our activities on the environment, society, economy, and the local community.

We are committed to understanding, monitoring, and managing our social, environmental and economic impact to enable us to contribute to society's wider goal of sustainable development.

This commitment is integrated into our core values, and we aim to demonstrate these responsibilities through our actions and within our corporate policies relating to:

- Staff and people
- Customers and stakeholders
- Suppliers
- Health and Safety
- Environment
- The Community



The community

We recognise and understand the significance of the local community within which we operate. We aim to enhance our contribution to the community by being sensitive to the needs of local people and groups and promoting ethical and socially responsible operating activity.

We actively support and donate to the following activities within the local community in which we operate:

- Digital Garden Project
- Digital Equipment Loan
- Equipment and Resource Loan

This article provides an overview of our outdoor spaces programme, specifically our digital garden project and current programme which is designed to highlight the various benefits of growing and harvesting fresh fruits and vegetables to support healthy eating.

The Digital Garden project

In June 2020, SSERC applied for a grant from the Scotland Loves Local fund to take an area of wasteland at SSERC HQ (Figure 1) and turn it into a digital garden (Figure 2) in a collaborative programme between SSERC and King's Road Primary School, Rosyth. We were also fortunate to gain Fife Council and Arnold Clark Community Fund funding to support the project. >>

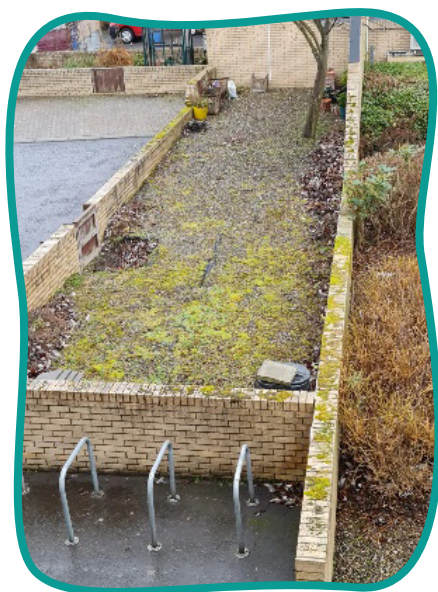


Figure 1



Figure 2



Figure 3

What is a digital garden?

It's a standard allotment type garden, but with digital devices monitoring water moisture levels, greenhouse digitally controlled irrigation and ventilation systems, QR codes identifying plants and providing time lapse video of growth. There is even a movement-sensor camera that captures wildlife movement that the school can access. King's Road Primary School learners worked with SSERC staff to design, build, and plant fruits, flowers, and vegetable seeds (Figure 3).

We were delighted that Provost Jim Leishman agreed to formally open the SSERC digital garden in June 2022 (Figure 4). The (then) Chair of the SSERC Board (Alan Nimmo) and



Figure 4 - Alastair MacGregor, Jim Leishman and Alan Nimmo.

the SSERC CEO (Alastair MacGregor) were present for the opening. SSERC staff, Kings Road Teaching staff, learners, parents, guardians, and carers also attended the opening, where the highlight was harvesting some of the produce grown (Figure 5).



Figure 5

Such was the success of the digital garden project; we were pleased to receive sponsorship from Bell-Wylie Consulting and Walter Patterson Consulting, which allowed us to continue to work with King's Road Primary School in the academic year 2022/2023, where the focus moved to the Primary 5 class growing:

- Runner beans
- Potatoes (first early and main crop)
- Broad Beans
- Peas
- Sunflowers
- Courgettes
- Plus a variety of other pollinator-friendly plants.

We marked the end of term with a celebration event on Wednesday, 14th June 2023 and further harvesting of crops (Figure 7).

SSERC will continue to work with King's Road Primary School in the academic year 2023/2024.

Garden Project 2 Growing fresh and organic fruits and vegetables to support the concept of healthy eating

Having successfully developed a digital garden in partnership with King's Road Primary School, Rosyth, we want to develop a second garden within a derelict space within the grounds at SSERC HQ (Figure 8).

The purpose is to work with a local primary school to develop this space into a garden area that will grow a variety of fruits and vegetables that can be used to support the concept of healthy eating. The project will also embed various aspects of the curriculum, including health and wellbeing, numeracy, literacy, outdoor education, and sustainability. >>



Figure 8 - The derelict space within the grounds at SSERC HQ, Garden Project 2.



Figure 7 - End of term celebration event further harvesting crops.

We are grateful to the following organisations for supporting our latest garden project:



Stronger Starts

In partnership with



Tesco Stronger Starts...

We are delighted that the local community surrounding SSERC HQ will have the opportunity to support the development of this project via the Tesco Stronger Starts programme, where customers in the following Tesco stores will be able to vote for our project:

Tesco Extra	Turnstone Rd, Dunfermline KY11 8EG
Tesco Superstore	174 Queensferry Rd, Rosyth, Dunfermline KY11 2JF
Tesco Superstore	Regents Way, Dalgety Bay, Dunfermline KY11 9UY
Tesco Superstore	Winterthur Lane, Dunfermline KY12 7BD
Tesco Express	73 Aberdour Road, Dunfermline KY11 4RB

To vote, you must purchase within any of the stores of any value. You will receive one token per transaction, and buying a carrier bag to obtain a token is unnecessary.

Please pass this information on to anyone in the Dunfermline/Rosyth area – colleagues, friends, and family. We are looking for your support.

Voting will commence in-store from the first week of October 2023 until mid-January 2024. So, let's all work together to mobilise and maintain support through the voting period.



Practical Work in Primary Science

Anyone working or interested in primary science in the UK

COMPLETE THE SURVEY

Share your views to support the development of national guidance on practical work in primary science



Or link via <https://tinyurl.com/2muryk8d>

Dr Sarah Earle, Prof Lynne Bianchi, Dr Stuart Read & Dr Julie Jordan



Want to experience excellent inspirational computing science professional learning?

We deliver engaging, motivating and relevant professional learning to enable you to equip learners with the knowledge and skills in computing science and STEM for the future.

“Computing Science was a subject I once lacked confidence in delivering/supporting others in, I now feel much more equipped to advise and refer staff to appropriate resources to help.”



Digital Skills and Computing Science Professional Learning Courses



Want to experience excellent, impactful STEM professional learning?

At SSERC, we provide unmatched expertise, practical resources and enriching experiences.

Enhance your STEM knowledge and skills by signing up for our courses today

“My approach to teaching STEM has changed (for the better). Increased pupil engagement with their learning has been a joy to see.”



Early Years and Primary Professional Learning Courses



STEM Ambassadors information session



Scotland

STEM Ambassadors in Scotland information session for primary schools

Thursday 7 December 2023 – 15:30-16:30 (on Teams)

Delivered by on behalf of

STEM Ambassadors in Scotland, the STEM Ambassadors Delivery Partner based at SSERC, can support you to deliver STEM in your setting. STEM Ambassadors in Scotland supports key events throughout the year such as Maths Week Scotland and British Science Week and supports teachers throughout the year to engage with STEM professionals and students.



BOOK NOW!



Find out more...

Email stemambassadors@sserc.scot
Website www.stemambassadors.scot/
Resource Hub resources.stemambassadors.scot/
Twitter/X twitter.com/ScotSTEMAmb

During this short online session, you can find out more about how the programme works, who our STEM Ambassadors are, get ideas about what you can do, and how to get started. There will also be the opportunity to ask questions at the end. <<

The risks of using websites or social media for STEM activities

Be aware of the risks of using websites or social media for ideas for STEM activities. The internet is not always your friend when planning STEM activities for your learners.

We have often been asked about Elephant Toothpaste – in this activity, hydrogen peroxide is decomposed into oxygen and water using a catalyst. Adding food colouring and washing-up liquid creates a coloured foam.

Many learners have seen Elephant Toothpaste online and via social media. Videos of large-scale versions of Elephant Toothpaste have gone viral, as YouTubers vie for the world record for the volume of foam produced.



Many websites provide a simple recipe which is sometimes labelled as “Try this at home” or “Safe for children”. Although certain websites claim this activity to be safe, hydrogen peroxide of any concentration is classified as a dangerous chemical in the UK for Early Years and Primary settings (the Association for Science Education’s “Be Safe! Fourth Edition”). The chemical reaction is exothermic and gives out heat, which can also pose a risk. For these reasons, **we do not view Elephant Toothpaste as a safe activity to be carried out in Early Years or Primary**, either by learners or as a demonstration.

Minimise the risks – achieve the same learning

It is always worth considering how a safer activity could provide high-quality learning opportunities.

A similar but safer effect can be obtained by reacting vinegar and bicarbonate of soda. It is possible to obtain a coloured foam, as in the Elephant Toothpaste activity, by adding food colouring and washing up liquid, but this could introduce misconceptions. As always, we would recommend focusing on the learning and links to the curriculum.

When considering STEM activities for use with 3-12-year-olds, please consult the Association for Science Education’s “Be Safe! Fourth Edition”. This is the Health and Safety Handbook for Science and Technology in Early Years and Primary.

If in doubt, give SSERC a shout!

Contact us at primary@sserc.scot for STEM Health and Safety advice. <<

Great Science Share for Schools - sustainable science

SSERC continues to be a Great Science Share for Schools Champion for a third successive year. This year the theme is 'Sustainable Science'.

Caring for the world around us should be part of our everyday. This year, your learners can ask questions they care about. They could think about the materials used in school and how to reuse, repurpose or recycle them; the natural world around them and how to enhance biodiversity or how they travel from walking, cycling and using public transport.

There are many questions to investigate and share that link to air quality, ecosystems and the interconnected way we live. <<

Inspire your pupils to ask-investigate and share scientific questions using the theme of 'Sustainable Science'.

Caring for the world around should be part of our everyday. This year your pupils can ask questions *they* care about. They could think about the materials used in school and how to reuse, repurpose or recycle them; the natural world around them and how to enhance biodiversity or the way they travel from walking, cycling and using public transport.
The choice is theirs!

There are so many questions to investigate and share that link to air quality, ecosystems and the interconnected way we live.



It's time to make a change!

Great Science Share for Schools works in partnership with British Science Week. With their theme of 'Time' it's a perfect way to encourage pupils to think:

- How have we adopted more sustainable practices over **time**?
- Where in our community can we spend **time** sharing our ideas about being more sustainable?
- When is the best **time** to get other people involved in sustainability projects?



Get started with the GSSfs QUESTION MAKERS

Question Spinners, Question Frames, Wonder cards and more offer you the chance to get pupils asking and developing questions about the world around them.

Check [Great Science Skills Starters](#) to upskill you and your pupils on using science enquiry.



ENGINEERING EDUCATES

SSERC is delighted to be supporting schools across Scotland with Engineering Educates, led by SEERIH (Science & Engineering Education Research and Innovation Hub) at the University of Manchester.

Activities inspiring 7-14 year olds to think as engineers, exploring and designing solutions to real-world problems

Engineering Educates provides a range of **curriculum-linked STEM activities for learners aged 7-14** in Primary schools, Secondary schools and STEM Clubs. These projects are fully resourced with online materials and suggested further ideas.

This year's theme is British farming, with three pathways available depending on the age of your learners. The activities **link to Maths, Sciences and Technologies** – including Engineering and Computing Science (programming Micro:bits) and are underpinned by environmental considerations and **sustainability**. Learners **develop skills** such as creativity, problem-solving, collaboration and communication. They work through the Engineering Design Process to ask questions, imagine, plan, create, test and improve solutions to real-world problems in farming.



The Soil Defenders pathway explores the theme of arable farming, with activities linked to soils, planting and growing. Learners consider ways to

reduce the impact of soil compaction due to heavy farm machinery so that crops can grow better. Suggested age range 7-9 (First or Second Level).



The Cattle Carers pathway is all about dairy farming, with learners considering how to improve the health and well-being of dairy cows. They design living spaces for cattle and explore how to reduce the emission of greenhouse gases on dairy farms. Suggested age range 9-11 (Second Level).



The Sustainable Farms pathway focuses on environmental considerations in farming and for farms of the future. Learners design solutions for sustainable farm machinery and investigate automation techniques. Suggested age range 11-14 (Third or Fourth Level).

Schools can be **linked with engineers and farmers** to support learners with the project.

What happened last year?

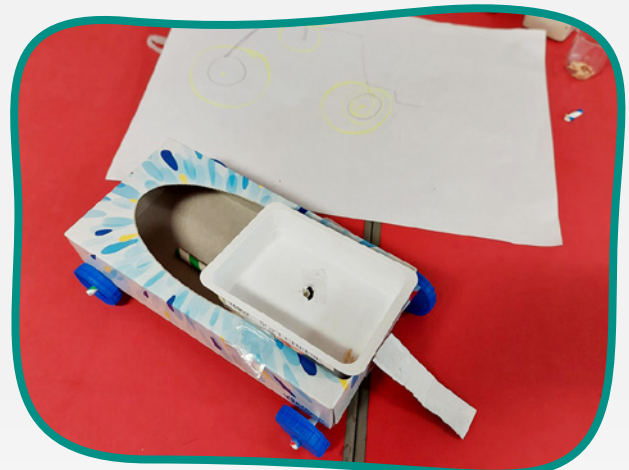


Engineering Educates activities in Scottish schools in 2022-2023:

- 102 sign-ups from 79 educational settings across Scotland.
- Selected schools matched with engineers (through STEM Ambassadors) or farmers (through the Royal Highland Education Trust, RHET).
- Over 200 learners (estimated) attended an online celebration event.

At Ratho Primary School in Edinburgh, P7s designed and built barns to enhance dairy cows' wellbeing. P4s designed devices to scare away pests who might eat arable seeds. >>





At Pitteuchar East Primary School in Fife, learners programmed Micro:bits to monitor dairy cow wellbeing. They developed wearable technology so a cow could be monitored using the device.

“We had webinars on Friday that showed us interesting facts about farming. And we got a visit from farmer James and he showed us a cow horn and a tooth.”

J, P4, Pitteuchar East Primary School, Fife

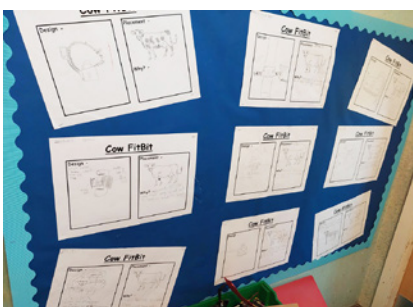
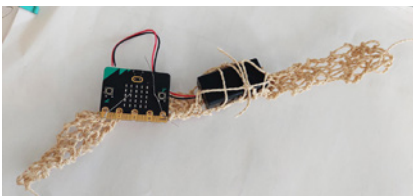
Learners in P3 from Gordon Primary School in Aberdeenshire planted crops and observed them growing. They presented their work to the school and parents in an assembly.

How can our school get involved?

Register on the [Engineering Educates website](#). Registration comes at no cost and provides access to the full range of online resources, professional learning, support and updates about a range of linked opportunities.

“We enjoyed it because we love farming and found it fun and interesting.”

P3-5, Kirkiner Primary School, Dumfries and Galloway



“I liked building the barns and working out the architecture.”

TM, Hawthornden Primary School, Midlothian

Webinar dates...

A series of webinars with the Engineering Educates team, to walk you through the different activities.

SCOTTISH CURRICULUM FOCUS

- Introduction** **Big picture overview**
30 October 2023, 3.45-4.30 pm
- Session 1** **Maths focus**
7 November 2023, 3.45-4.30 pm
- Session 2** **Science focus**
14 November 2023, 3.45-4.30 pm
- Session 3** **Technologies focus**
21 November 2023, 3.45-4.30 pm
- Session 4** **Technologies focus**
28 November 2023, 3.45-4.30 pm
- Session 5** **Technologies Computer Science focus**
5 December 2023, 3.45-4.30 pm

Book here!



Young STEM Leader Week

To celebrate the fantastic work that is going on all around the country we are again running **#YoungSTEMLeaderWeek** from Monday 30th October – Friday 3rd November 2023. We are inviting Young STEM Leaders across the country to participate in the programme by leading an engaging activity, event or interaction across their learning community and joining the discussion on X (formerly Twitter).

The theme this year is ‘Sustainable Steps’ and each day each you can visit [our website](#) where you will find activities, online events and questions. These encourage young people to collaborate and think about different aspects of the sustainable development goals and how they can contribute and lead change.



Monday

Reflect on the Sustainable Development Goals

Tuesday

Design Sustainability Superheroes

Wednesday

Think about Sustainable Goals in our Schools and Communities

Thursday

Think about the Global Impact and Bigger Picture

Friday

Take Action for Change

There will also be a series of face-to-face events running throughout the country and we encourage Tutor Assessors to [sign up](#) and attend your nearest one to network and share ideas:

- **Monday 30th October**
4.00-6.00pm, SSERC Headquarters, Dunfermline, Fife
- **Wednesday 1st November**
4.30-6.30pm, Greenfaulds High School, Cumbernauld
- **Thursday 2nd November**
4.00-6.00pm, An Lochran Campus, Inverness

We look forward to welcoming you to our Young STEM Leader week and hearing about all amazing activity that is happening in all the schools and communities.

If you haven't already signed your school up to the Young STEM Leader Programme then you are welcome to participate in the activities online and use these to launch the programme in your class/school.

Supporting your learners to complete a Young STEM Leader award is an excellent way to engage your whole learning community with STEM and it's **free** for all any school, youth centre or community organisation in Scotland.

We encourage primary schools to complete the **non-formal** levels: YSL2 and YSL3, which are aligned to Curriculum for Excellence Second and Third levels.

It's easy to start delivering the Young STEM Leader Programme (YSLP) by becoming a Tutor Assessor (TA). Training takes two hours and is delivered as an online twilight session by SSERC staff.

The training will cover the award details, assessment and our bespoke online platform for marking and reviewing evidence. You can book a session [here](#). <<

Find out more

Web: www.youngstemleader.scot

Email: youngstemleader@sserc.scot



External partners and organisations have submitted the articles that follow. These are not SSERC-devised activities; however, they offer examples of practical STEM-based activities that could be delivered in the classroom.

Mission H₂O

We're excited to announce the launch of Scottish Water Generation H₂O - a new nationwide campaign empowering every young person in Scotland to take positive action to protect Scotland's water.

Mission H₂O is the primary resource bringing the Scottish Curriculum for Excellence to life for learners aged 5-11 through hands-on activities, a whole-school assembly, prizes and more!



Scottish Water

GENERATION H₂O



Register now and download the free resources here!



NATIONAL SCHOOLS PARTNERSHIP

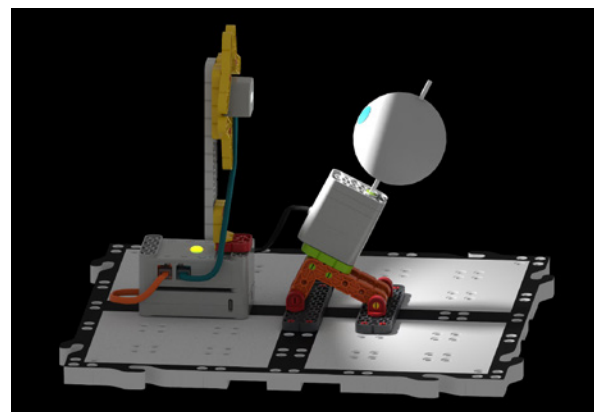
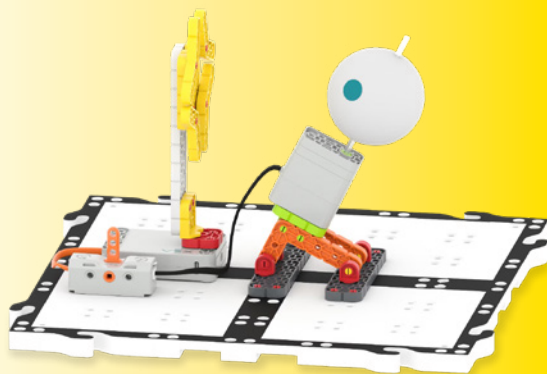
VEX GO is day and night for teaching STEM!

The new VEX GO Day and Night STEM Labs lesson plans are perfect for First Level science to show how the Earth spins on it's axis resulting in day and night.

Build a model of the Sun and Earth, complete with tilted axis and explore how the Earth rotates to cause the day and night cycles, and why it appears that the Sun moves across the sky during the day.

This is one of 32 VEX GO STEM Labs containing over 100 lessons covering all areas of STEM.

See them all here!



Introducing Sphero Blueprint Build Kit

Designed for Secondary school classrooms, the Blueprint Build Kit enables students to learn foundational engineering concepts as they design and build working prototypes. With its approachable design, easy-to-handle parts, and supporting content, Blueprint Build makes engaging with mechanical and structural engineering hands-on, fun, and accessible to aspiring engineers of all abilities.

Key features and benefits

Easy prototyping

Blueprint Build's modular parts are easy to assemble for rapid prototyping due to their practical size and visual and technical simplicity.

Hands-on problem solving

Solving problems is the foundation of engineering. Blueprint Build allows students to quickly design, build, and test mechanical and structural engineering concepts in the classroom.

Lessons & unit plans included

The Blueprint Build Class Pack comes with 50+ hours of in-depth, standards-aligned lessons and unit plans and an in-depth Educator Guide.

Relevant learning

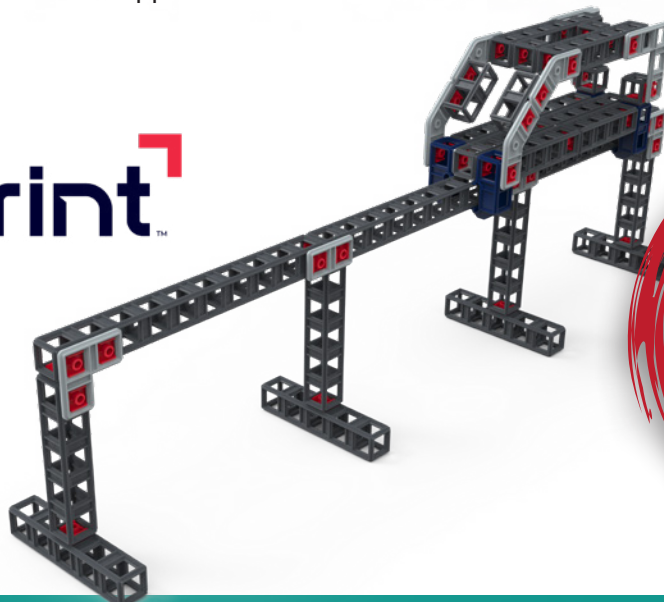
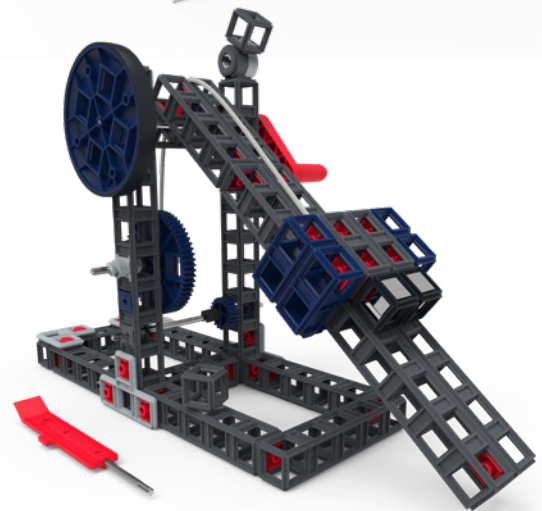
Flexible and standards-aligned unit plans to help teach students about simple and compound machines and calculating mechanical advantage.

Engineering & beyond

Students explore cross-curricular concepts in engineering and design, while learning critical thinking, problem solving, and collaboration skills.

Build in CAD

The Blueprint Build Kit supports various CAD certification curricula with free Blueprint Onshape documents, as well as Solidworks and STEP files for CAD software support.



Sphero Blueprint
build kits will be
available January
2024

Learning for sustainability with Marty the Robot

At Robotical, we're eager that Marty can be used to teach sustainable development education, global citizenship and social welfare. That's why our education team has worked hard to produce some fantastic [lessons and activities](#) that introduce children to the ways we can help people and the planet (Figure 1).

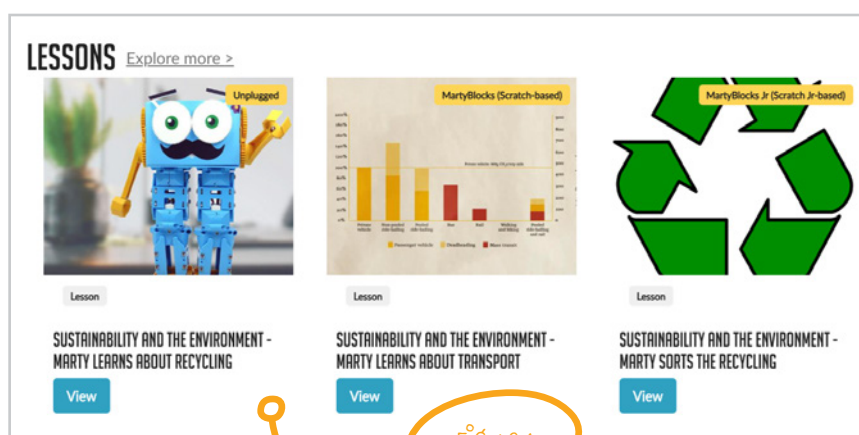
Marty is easy to integrate into the broader sustainability-themed curriculum. Robots can be used to teach children about ecosystems, climate change, and conservation while incorporating robotics as a practical application of these concepts.

For example, we have created lessons to teach children about the importance of recycling like [Marty Learns About Recycling](#) and [Marty Sorts the Recycling](#).

Cross curricular learning with Marty

With a multitude of [cross curricular lessons](#) on our [Learning Portal](#), it's easy to find a lesson or activity that promote a well-rounded and adaptable education that prepares students for the complexities of the real world.

For example, our 'Cross-Curricular Learning Lesson Pack' contains five lessons that focus on literacy,



numeracy, and social and emotional learning to encourage connecting and combining concepts, skills, and knowledge from multiple subject areas.

Using Marty to teach AI and machine learning!

In an increasingly technology-driven world, teaching children about machine learning and AI is essential to equip them with the skills and knowledge needed to thrive.

Technology literacy is vital, but it can be hard to find cost-effective solutions that encourage engagement with STEM learning. Marty the Robot makes STEM learning exciting for all students and, coupled with 4 coding environments, can be used across a range of subjects and skill levels. Our numerous extensions to our [MartyBlocks](#) coding environment offer further opportunities for creativity and learning. Our newest extension introduces [AI and Machine Learning](#), encouraging students to connect and interact with Marty by training their own image or sound models.

We recently introduced the 'Teachable Machine' extension to our [MartyBlocks](#) coding environment. This extension uses [Teachable Machine](#), a web tool created by Google that enables the user to easily create machine learning models. >>

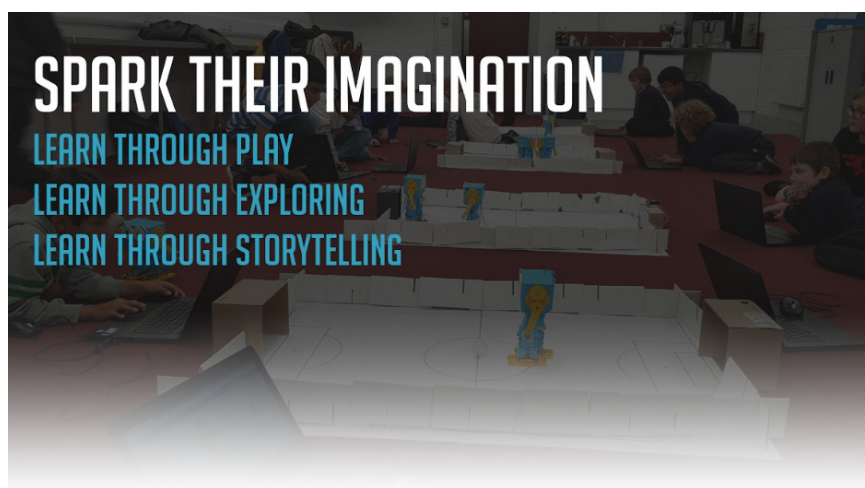


Figure 2

Using the step-by-step instructions provided in our [User Guides](#), it's a breeze to teach Marty to “hear” and “see”, bringing learning to life and allowing children to interact with Marty the Robot like never before (Figure 2).

You can now teach data with Marty!

The recently launched [sensor dashboard](#) is a graphical tool designed to enable users to visualize and interact with data collected from sensors. It provides a user-friendly way for students to monitor and analyze sensor readings in real-time, enabling them to make data-driven decisions and gain insights from the collected data (Figure 3).

It offers a [multitude of benefits](#), from problem-solving and troubleshooting to collaboration and optimization, and empowers aspiring coders to develop a deeper understanding of coding principles and apply them effectively.

Marty's sound functionality is even better!

Our new firmware update makes Marty's accents, languages and sounds clearer in the classroom.

Marty's sound functionality encourages creativity, allowing students to edit the pitch and volume of a vast library of sounds, record their own sounds, set Marty's voice and accent, and play notes and music.

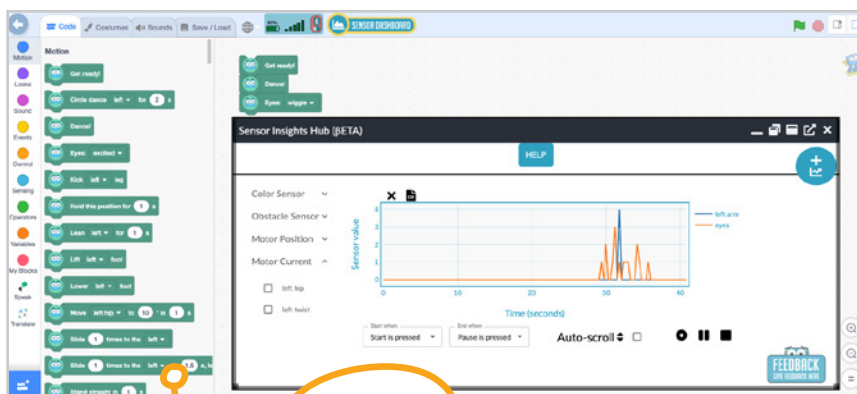
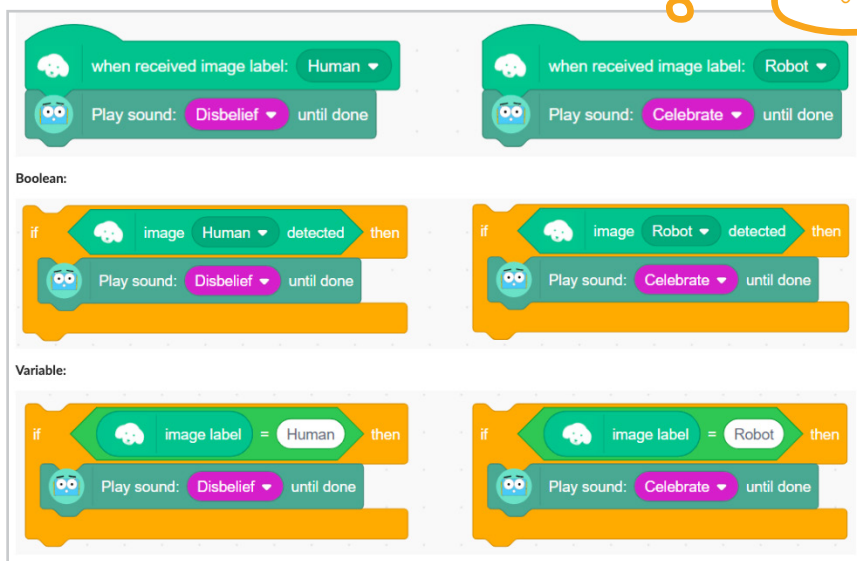


Figure 3

Marty also has a translation feature, with over 40 languages and accents to encourage cross curricular learning. If you already have a Marty, you can update your robot here to experience the updated sound quality.

Want to try Marty with your Class?

Robotical is offering **FREE** two-week trials. They'll even cover shipping and collection costs and provide virtual training for teachers. <<



Become a member of the ASE

September 2023



Reasons to join the ASE

- ✓ Termly Fortnightly e-update on news, research and events
- ✓ Member's magazine with insights and features
- ✓ Regional e-updates on local news and events
- ✓ Access to free or discounted professional learning seminars
- ✓ Free access to resources and guidance
- ✓ Exclusive content in podcasts and webinars
- ✓ Pathway to chartered status: RSciTech and CSciTech
- ✓ Member discounts to ASE events – including our annual conference and partner organisations
- ✓ Opportunities to have your say on national consultations and surveys
- ✓ Opportunities to engage and learn within ASE: presenting, writing, representation and advocacy
- ✓ Option to add on an ASE Journal or Hub of your choice for an additional fee

£45

ASE Membership

£25

Technicians / retirees

£FREE

Trainees

Continuous learning and professional development: enhance your science teaching skills and knowledge

Advocacy and influence: ensure your voice is heard and help shape the future of science education

A community of support: meet & connect with other science education professionals who can support you throughout your career

Access to science teaching resources and information: including research, guidance, publications, news and events

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Join today!



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