

ISSUE 04 AUTUMN 2018

CLEAPSS

EHPLOPE

SCIENCE, D&T AND ART

FUN ACTIVITIES *The Electric* ISSUE



ALL ABOUT BATTERIES

CLEAPSS COMMENT

Welcome to our Autumn 2018 issue of **EXPLORE** in which we delve into the fascinating world of circuits and electricity.

In many ways, electricity exemplifies the best and worst of school practical science. It allows children to get practical, take a lead in their learning and work collaboratively. It's also the perfect vehicle for problem-solving, real-world applications and cross-curricular projects. Yet too often the dread of the kit not working can over-shadow a teacher's enthusiasm. So, read on, and let us inspire you with some low cost, easy prep electricity lesson ideas, that will be of interest to you even if you're not teaching Y4 or 6.

This term's Teaching idea is an introduction to our new activity **Steady hand game**. Developed by Samir our physics advisor and trialled at Eastfield Primary School in Enfield, this simple and inexpensive game provides a great context for children to learn about series circuits and switches.

Remember, teaching electricity is safe! Granted, crocodile clips can present impromptu, if painful, jewellery temptations, but with a few clear rules, and by following some simple guidance, electricity activities can be safely managed. Children really can be left to take the lead (pardon the 'shocking' pun) and if you are not

sure about anything, we are here to support you via the Helpline.

One important consideration for you as teachers is which batteries to use. In our Doing things safely article we explain which batteries are appropriate for open circuit work and why. Don't worry if you're using the wrong ones, there's a simple, easy and cheap solution.

This term's guest writer is Dr Sarah Earle talking about how some of her partner Welsh schools have been using conductive and insulating dough as part of their teaching and assessment of electricity. The article includes an easy-to-make dough recipe.

Ogden Trust is well known for promoting primary physics. Their contribution includes links to free electricity resources and their P3L electricity training days.

This term we're delivering a primary training day on Thursday 6th December in Uxbridge (search **courses** for full details).

Don't forget you can stay in touch by: reading **EXPLORE**, regularly checking our website (we're adding new stuff all the time), following us on twitter **@CLEAPSS_primary** and by signing up to our group emails. To contact our Helpline: email **primary@cleapss.org.uk** or phone **01895 251496**.

Here's to another year of exciting primary practical work!



Primary Section Leader at CLEAPSS



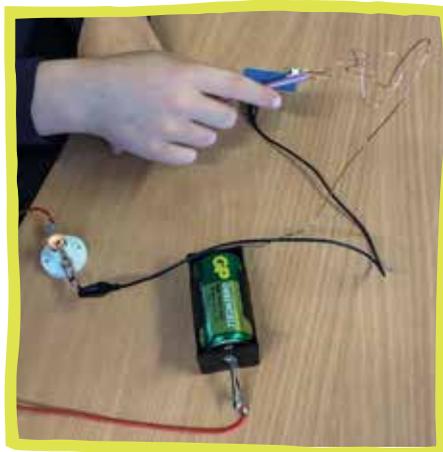


BEAT THE BUZZET

Making a game can help make learning fun, engaging and purposeful. Our **Steady hand game** provides an opportunity for children to learn about circuits in a real context.

The activity lends itself to many of the principles that children need to understand about electricity e.g. that electrical components only work if the circuit is complete because electricity needs to flow around the circuit and that a switch is a break in the circuit which stops the flow of electricity.

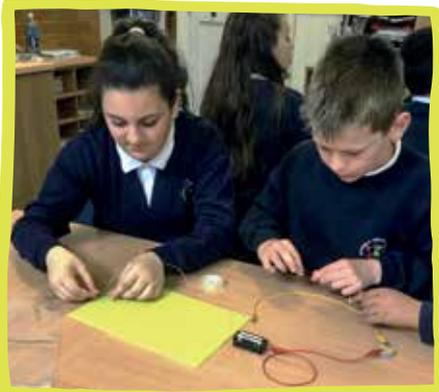
Y6 teacher and Science Leader Annabel Goodfellow of Eastfield Primary School kindly field-tested the activity for us. Annabel made the activity into an enquiry by showing her class a shop-bought steady hand game (its circuitry concealed in its plastic base). She then posed the question 'how does this work?' She gave the children the necessary components and set the challenge to put them together to make a working game. The children tried several iterations before they produced a working series circuit that included a buzzer and a wand that acted as a



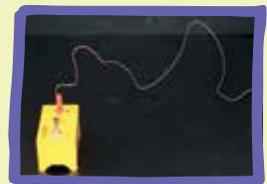
switch. For example, some children connected all the components together but left out the wand, consequently the buzzer buzzed continuously.

The purposeful learning generated by the activity was palpable. The children were determined to make their game work. Annabel supported the children by reminding them of what they already knew about circuits, and by challenging them to apply their knowledge to the components in front of them. By the end of the activity the children were able to recognise that the wand was a switch which opened and closed the circuit in exactly the same way as in other, more conventional, circuits they had previously used. They could also see how making or breaking a complete circuit really does turn everyday electrical devices on and off.

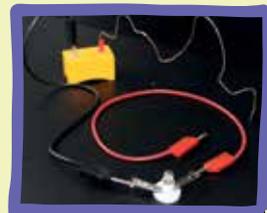
Search **Steady hand game** for full details.



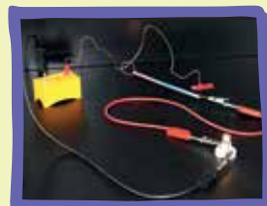
OVERVIEW



Use copper wire to make a 'track'.
Connect one end of the wire track to the battery holder and use a lead to connect the other end of the battery to the bulb holder or buzzer.



Attach a second lead to the other side of the bulb holder or buzzer.
Use a piece of copper wire to make a 'wand' and attach it to the lead from the bulb holder/buzzer.

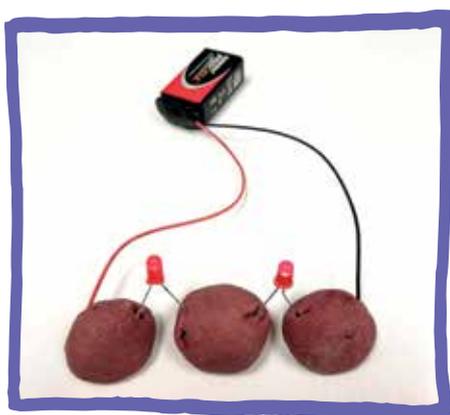


Insert the loop of the wand into the track and stick the free end of the track on to the table.

If the player successfully navigates the track with the wand, the bulb/buzzer remains off. If the player touches the track with the wand, the bulb lights or the buzzer will buzz.

LIGHTS ON...LIGHTS

Practical science with a full class can be a daunting prospect, with concerns for kit and collaboration leaving little time to think about what the pupils are learning. By planning a single assessment focus for the activity, teaching and assessment becomes more manageable. The Teacher Assessment in Primary Science (TAPS) website's Focused Assessment Database includes example science activities that demonstrate specific assessment foci eg controlling variables or interpreting data etc. The element of working scientifically focused on in each example is governed by the topic or activity.



Conductive dough being used to light low resistance LEDs

The activity

When working with Welsh teachers on TAPS Cymru, they wanted to try something which went beyond 'make a circuit'. One teacher challenged the children to use a battery, wires, one light-emitting diode (LED), to start with, and balls of salt dough to make a circuit to test if the dough was a conductor. For this activity they made systematic observation the assessment focus.

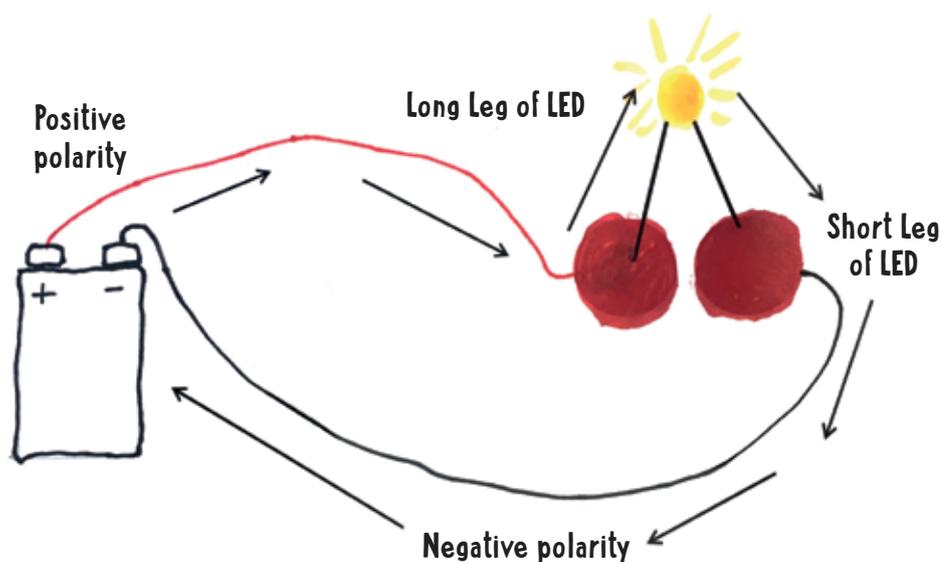
The conductive dough has a higher resistance than a wire, so it is important to use low resistance LEDs. The LEDs have a polarity: short leg to negative, long leg to positive. It will depend on the age and confidence of your children, as to whether you leave them to discover this in their explorations, or if you tell them this at the beginning.

Practical notes

- The salt dough balls should not be touching otherwise the electrical current will take the short-cut through the dough, rather than flowing through the LED
- Use a PP3 (nominally 9V) battery to light the LED

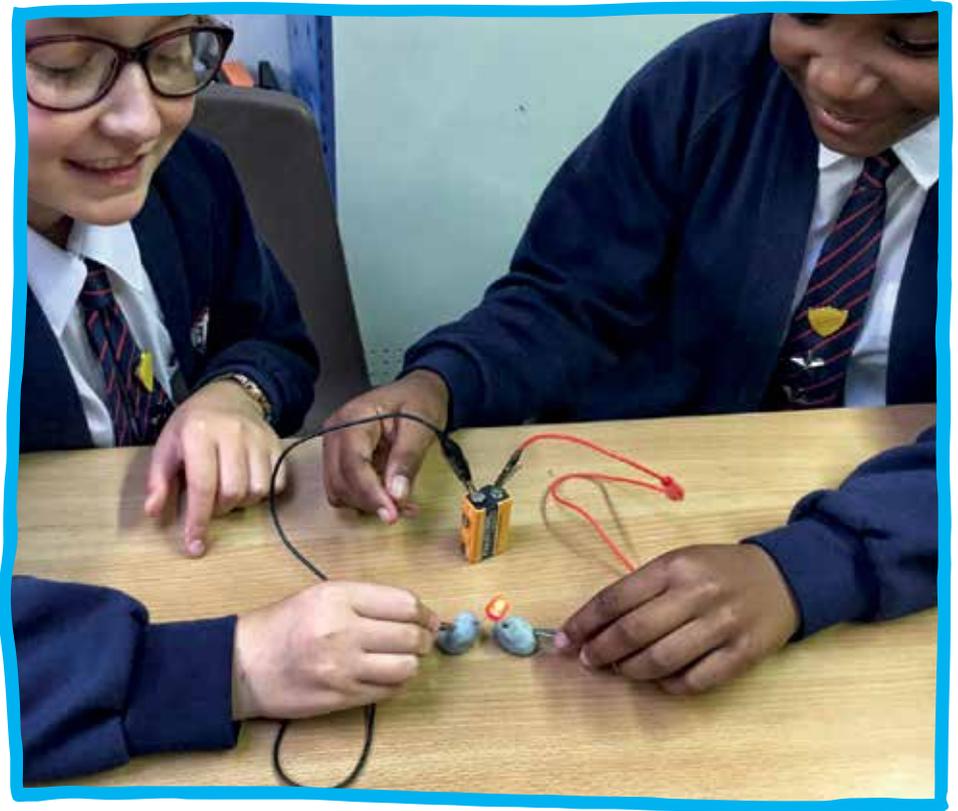
Making the dough

Shop-bought *play-dough* conducts electricity so can be used to investigate conductors and insulators, but the enquiry can be extended by asking the children to follow a recipe to make their own. Most recipes for making play-dough involve heating the dough, making it difficult for children to do in the classroom. The recipes overleaf are mixed cold, and the quantities given produce enough for approximately 6 pairs of children.



Teachers diagram, which shows how to include an LED and a representation of the flow of electricity, used by the children to correctly construct a conductive circuit.

OFF!



Insulating (sugar) dough

80 g plain flour
80 g granulated sugar
10 ml veg oil + food colouring

Very gradually add water and mix until dough consistency reached

Conductive (salt) dough

80 g plain flour
80 g salt
10 ml veg oil + food colouring

Gradually add water and mix until dough consistency reached



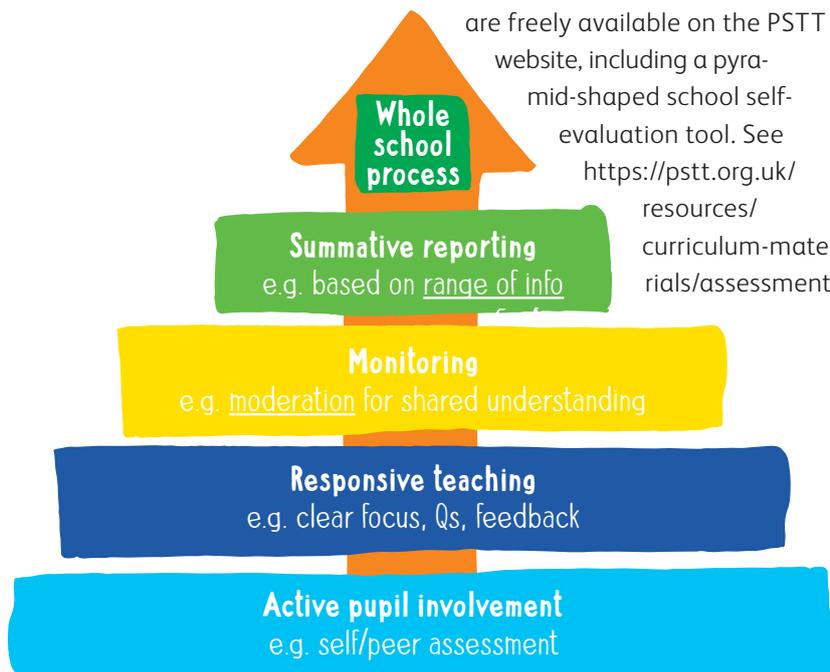
INSTITUTE FOR EDUCATION

Dr Sarah Earle leads the TAPS project at Bath Spa University. TAPS is funded by the Primary Science Teaching Trust (PSTT). All resources are freely available on the PSTT website, including a pyramid-shaped school self-evaluation tool. See <https://pstt.org.uk/resources/curriculum-materials/assessment>.

What's the advantage of using focused assessment?

The TAPS Focused Assessment approach allows the teacher and children to look closely at one feature of Working Scientifically, within the context of a whole investigation. The children were encouraged to think about their use of equipment and what happened because of their choices. The teachers watched and listened to groups working and, in some cases, asked the children to draw or photograph and label their circuits. Having systematic observation as a specific focus also steered the learning away from questioning why the dough is conductive/ insulating which is beyond the KS2 curriculum.

The Focused Assessment plan for conductive dough is available from: <https://pstt.org.uk/resources/curriculum-materials/assessment>



Putting the Phiz back into Physics

The Ogden Trust aims to support primary schools to develop children's early experiences of physics. Its website <http://www.ogdentrust.com/primaryresources> includes a number of free educational resources including simple guides for making an electroscope, a coin battery and a 'Scribblebot'.

Ogden Trust's Primary Physics Professional Learning (P3L) days are open to all primary teachers. The current P3L programme is focused on teaching electricity. The day includes sessions



where delegates will: develop their subject knowledge, learn how electricity can improve Working Scientifically skills, engage in electricity-related **making physics matter**



STEM projects and explore how electricity can be used to enrich EYFS provision. There are still opportunities to attend the Autumn term electricity P3L Day. For more information and to register visit <http://www.ogdentrust.com/p3l>

Tickets on sale now!
From only £110
Teacher bursaries available



Jim Al-Khalili

THURSDAY 6TH JUNE



Keynote talks



Practical workshops



Reflective practice seminars



Interactive talks



Science shows



Laura Schulz

FRIDAY 7TH JUNE

6 - 8 June 2019

Edinburgh International Conference Centre (EICC)

REGISTER YOUR INTEREST AT:

www.primaryscienceconference.org



Kate Bellingham

SATURDAY 8TH JUNE

“I've never been to a conference where the sessions were so relevant and of such high quality”

PSEC Delegate, Belfast 2016



POWERED BY BATTERY

Batteries are everyday items and we rarely question their safety. In most everyday circumstances this is fine. Electricity practical work however is not an everyday experience. In fact, it's an extraordinary and rich experience in which batteries are used differently.

Which batteries should I use?

A typical electricity practical activity might involve constructing a circuit from a battery, battery holder, wires, bulb and bulb holder. For this, and any other open circuit work ie any situation where the components are exposed and able to be moved or handled, it is important to use zinc chloride or zinc carbon batteries.

Why?

If a child creates a short circuit the battery and/or leads will become hotter. Some batteries will overheat and become hot enough to cause a burn, melt plastic holders and insulation, as well as vent hot fumes and corrosive chemicals.

What's a short-circuit?

A short-circuit happens if the positive (+) and negative (-) terminals of the battery are directly connected with a wire.



Using zinc chloride or zinc carbon batteries doesn't mean a short circuit won't happen. They are just more tolerant of short-circuits than others and are less likely to become very hot.

Where can I buy zinc chloride or zinc carbon batteries?

Zinc chloride and zinc carbon batteries are sold by educational equipment suppliers eg TTS, Philip Harris, TimStar, SciChem etc, and electronic components suppliers eg Rapid Electronics, RS Components, Farnell etc.

They are generally cheaper than other 'high powered' batteries but don't buy large stocks because their shelf-life is not particularly long. Typically they will last ~2 years, but some much less.

Check your batteries

Ensure your circuit work batteries state either zinc chloride or zinc carbon on them.

On the high street it's difficult to buy zinc-carbon and zinc-chloride batteries. UK supermarkets tend to stock alkaline and rechargeable types. For instance, Duracell does not manufacture zinc carbon or zinc-chloride types under the



Duracell brand name. Duracell batteries should not be used for open circuit work.

We advise you do not buy any batteries from online auction sites, market stalls or car boot sales.

We have also noticed that some budget sales websites described the battery type incorrectly.

The exception to the rule

Occasionally a PP3 size battery (nominally 9 volts) may be needed

for a specific electricity project, for example when using conductive dough. As sourcing zinc chloride and zinc carbon PP3 batteries is difficult, and because a brief short-circuit of a PP3 battery is unlikely to cause overheating, it is acceptable to use alkaline PP3s. Alkaline PP3 size batteries can become very hot under sustained short-circuiting therefore such activities require at least moderate supervision.

Search **batteries** and **levels of supervision** on the CLEAPSS website for more information or call the Helpline if you are unsure.





No more cabbage for the time being!

Congratulations to all schools and children that entered the 2018 CLEAPSS primary competition, No More Cabbage!

The judges saw a fantastic range of novel indicators and really enjoyed reading about the innovative and diverse enquiries undertaken by the young chemists in their quest to find an alternative to red cabbage.

We are confident that there are lots of promising young chemical engineers ready to design our future medicines and materials.

The winners from 2018 are:

Year 1-2: Bromley High Junior School, teacher Mrs S Kowalczyk

Year 3-4: Stephen Perse Foundation Junior School, teacher Ms Richardson

Year 5-6: St Peters Preparatory school, teacher Dr Evans

Overall Winner: Ferndown Middle School, teachers Miss Owen and Mrs Kiernan

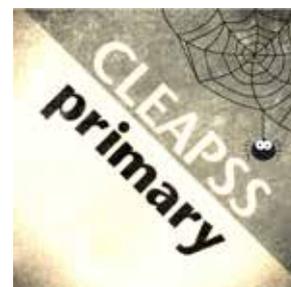
The winning children will be receiving trophies, goody-bags and certificates presented in special assemblies along with science equipment and resources for their schools. The overall winning school will also receive an exciting whole school science roadshow visit from Bristol ChemLabS.

With many thanks to our sponsors; ASE, SciChem and Primary Science Teaching Trust



STILL CAN'T FIND SOMETHING?

To ensure CLEAPSS primary guidance is concise and easy to use, we are continuously publishing new, updated and transformed resources on the CLEAPSS primary website. Any old resources yet to be updated are still available; either search **Legacy** or search using the old code of the document eg search **PS74** for the document on Using Plaster of Paris in Primary Schools. Remember to check the site, EXPLORE and our twitter feed regularly for latest updates and new resources.



Closing date for entries is Monday 1st July 2019

JAZZING UP JUNK

Young designers, engineers and scientists, are you ready to show us how creative and inventive you are?

Look for **jazzing up junk** competition on the CLEAPSS Primary website www.cleapss.org.uk

