

Organising and managing hands-on STEM activities for Early Years and Primary.

Version 4.0-9th September 2021

This document focusses on practical STEM activity in the classroom. More detail, particularly about wider school issues can be found in the official Scottish Government advice which can be found here (<https://www.gov.scot/publications/coronavirus-covid-19-guidance-on-schools-reopening/>) and here (<https://www.gov.scot/publications/coronavirus-covid-19-early-learning-and-childcare-services/>).

The guidance on physical distancing in Early Years and Primary remains the same.

- There are no distancing requirements for learners.
- Teachers and other adults should keep 1m apart from each other and from learners wherever possible.

Unless your school policy prevents the use of any form of equipment, then the good news is that hands on STEM activities can happen in your primary school. However, in these unprecedented times, your approach to planning and delivery of activities may need to be altered. Everything may take longer, from planning to setup, delivery and clear up.

The situation will vary significantly across the country: learner rolls, numbers and location of teaching rooms, their dimensions and arrangements will all differ, not just from Authority to Authority but from school to school. The advice in this document, therefore, is necessarily general in nature but SSERC will be happy to provide specific advice to schools and colleges if needed.

It is important to emphasise that the whole procedure for making arrangements for learners should be led by risk assessment. This risk assessment should directly address any risks associated with coronavirus so that sensible measures can be put in place to minimise those risks for learners, young people and staff.

Any further updates will be via a series of FAQs appended to the end of the document.

Check our website www.sserc.scot , **Twitter** and **Facebook** posts regularly for news of updates.

Versions

Version 1 (June 24th 2020)

At present the guidance is that physical distancing is set at 2 metres. If there are any changes to this then we will change the guidance to reflect it.

Version 2 (August 5th 2020)

Updated to reflect the changes announced by the Scottish Government at the end of July. Significant changes to the section on distancing but the hygiene and experimental sections are largely the same.

Version 3 (14th February 2021)

Minor updates to reflect the situation with regard to the phased reopening, starting with P1-3.

Version 4 (9th September 2021)

Some updates to reflect a number of relevant changes. Areas that have changed (other than minor rephrasing) **have the text in orange**.

General Guidance

Guidance on important matters including general distancing, movement around the school, arrival and departure is outwith the scope of this document. Useful guidance has been provided by the Scottish government and can be found here (<https://www.gov.scot/publications/coronavirus-covid-19-guidance-on-schools-reopening/>) and here (<https://www.gov.scot/publications/coronavirus-covid-19-early-learning-and-childcare-services/>).

In Early Years and Primary education, there is much overlap between STEM activities and other classroom activities but there are some measures that are more specific to science and technology.

A holistic approach

The measures outlined in this and other documents are none of them exclusive of others: they are part of a whole.

Good hand hygiene in your school does not mean that there is no need to maximise spacing. A reduction in interactions does not mean that you can neglect the cleaning of surfaces.

We all of us need to implement as many of these measures as far as we possibly can. It is the combination of approaches that will help us in our fight to keep the coronavirus under control.

You may have come across relatively recent research showing that the transmission of Covid-19 from surfaces is minimal. That does not, however, mean that we should stop all cleaning and sanitising. Firstly, even if the effect on covid is minimal, every little helps. More importantly, good hand/surface hygiene definitely **does** help stop transmission of other viruses such as flu and norovirus and so will still contribute to reducing the strain on the NHS.

Early Years

The situation regarding STEM in Early Years education is largely covered by current government advice

<https://www.gov.scot/publications/coronavirus-covid-19-phase-3-guidance-on-reopening-early-learning-and-childcare-services/pages/groups-and-cohorts/>

This gives guidance on:

1. Hygiene and cleaning
2. Limiting children's contacts
3. Use of outdoor spaces and much more

As far as any STEM activities go, advice will be very much in line with that for other Early Years activities.

1. Make use of outdoor learning activities where possible.
2. Wash hands with soap and water after any outdoor activity or after using any sand, water, play dough etc. for STEM activities
3. Where possible try to avoid the sharing of equipment for STEM activities. Discourage children from putting any shared items into their mouths – wash hands correctly after touching any contaminated resources.
4. Follow the manufacturer’s instructions and guidance from the Scottish Government and your employer when washing any resources or other equipment used for STEM activities.

Primary Schools

Classroom layout

The change in the distancing requirements mean that you will be able to have your full complement of learners in the classroom. That does not, however, mean that things are completely back to normal.

1. You need to ensure that there is a 1m space between the teacher’s desk (the back of it where the adult may sit) and the nearest of the learners – if there are any occasions where learners might be sitting at desks in this way. So if there are any tables right up against the teacher’s desks, they will need to be moved.
2. Try to ensure, where possible, in science classes, that learners are not working face to face. If they are working together then it is much preferable if this is done side by side. This may involve some moving of tables/desks.

Permanent or semi-permanent groupings

There is no requirement to have learners in fixed or semi-permanent groupings but, if possible, it is still a good idea to limit children’s contacts.

The government’s advice is that if possible it is preferable to keep learners in fixed groupings. This is particularly relevant in group investigative work which, but its very nature, is likely to involve closer interactions.

Consistency of groups is beneficial (**though not required**), and efforts should be made to keep children within the same groups for the duration of the day or session, where possible. More than one group can use a large space, but trying to keep learners in smaller groups rather than larger groups is sensible.

It is important to emphasise that **these are not all-or-nothing approaches**, and will bring public health benefits even where used partially (for example if membership of groups stays consistent throughout the day, but changes across the week). **Additionally, the words, where possible' are important here. If it would negatively impact on teaching then don't do it.**

Managing hands on activities

Planning

We know that, for a range of reasons, practical activities are most often carried out in groups. While there is no longer a strict expectation that learners will need to work individually, Wherever possible, working independently should be the first choice. Your approach to planning will need to take account of the following:

Equipment

Does your school have enough equipment for individual working, as each learner would need to have their own set of equipment. This needs to be assessed before school starts and extra purchased if needed.

Assisting learners

It is expected that where possible, teachers (and classroom assistants) will keep a 1 m separation from learners as well as each other. However, the guidance does accept that brief interactions between teachers and learners closer than 1 m are inevitable in the teaching process: indeed in many ways they are an integral part of it.

Common sense suggests that these interactions should be as brief as required to achieve the aims and the distances involved should be the maximum appropriate.

Government guidance does not **require** the use of face coverings in these cases though if individual teachers may feel it appropriate, they are quite entitled to. Likewise, any children who have a desire to wear a face covering should be allowed to.

Choice of activity

1. **Some learners may struggle to work alone. For activities that involve solo working, they should be planned that can be undertaken without much need for additional hands-on support.**
2. Some types of inquiry or activity will be more suited to working alone than others. For example, a simple classifying activity - such as exploring magnetic and non-magnetic materials e.g. **Marvellous Magnets** or exploring **Optical Illusions** should be possible. Learning opportunities that rely upon comparative testing, such as investigating **Hydrogels** or **Let's Talk Bogs** - where learners compare the absorbency of different materials, will be difficult for a single learner to complete. This doesn't mean the activity cannot be done.
3. Try simplifying activities, for example by cutting down the number of variables, alternatively, you can give each learner a different material to test and then collate class data at the end.

4. Choose activities that the learners will have a reasonable chance of completing on their own, especially activities that have supporting video tutorials and require minimal resources, yet support understanding of scientific concepts – **Build a Climbing Bug – Exploring Friction** or **Make a Balancing Butterfly – Centre of Gravity/Balance**
5. Challenging tasks may demotivate learners if they cannot finish them and the 1 m distancing prevents you from providing the support that you usually would – though it is important to stress that you are not prevented from being close to offer support but ideally this should be for a relatively short period at a time.
6. Do not rush to introduce new practical skills, certainly until the learners become more confident in working on their own, choose activities that you know they will be able to carry out safely and successfully. How skilled/dextrous are the learners when working with equipment? How much experience have they had in relation to using a piece of equipment?
7. Look for activities that use recyclable resources rather than the standard equipment that will have to be cleaned. Make use of recycled/recyclable materials that learners may be able to bring in from home themselves – e.g. experimenting with sound by making a **clucking cup** (with additional information available via SSERC STEM **Bulletin 69**) or exploring the properties of gases by making a **pneumatic snappy dragon** (with additional information via SSERC STEM **Bulletin 75**).
8. Step by step instructions and the explanation of key concepts could be viewed by learners via on-line tutorials, such as those provided by **SSERC's home learning pages** – further activities and advice will be posted on an on-going basis
9. Practitioners will need to consider the platform used to view these videos and ensure content is age and stage appropriate. If learners are spending a proportion of the week learning from home, practitioners may consider teaching key concepts in class and setting engaging practical STEM investigations/ challenges for completion out of school – for example exploring forces acting on a rocket in school and setting a **balloon rocket challenge** for completion at home. You may wish to share links with parents/carers if home schooling continues.
10. The incorporation of practical activities that require minimal, easy to source resources is essential to ensure that all learners can access these learning opportunities at home and school.
11. There is now no need to worry about sanitising shared items like pencils and rulers (or science equipment) in the classroom. But it is prudent to reduce any sharing of items as far as is convenient. If there are kits available for each pupil, this is less of an issue.
12. Think carefully about activities that often require troubleshooting/adult intervention or replacement equipment, for example electrical circuits. These can be unreliable and you will not be able to directly support the learners. Again, this doesn't mean that this type of activity cannot be done, but more planning and management will be required.

13. Can you do activities outside where there is more space? Now is a great opportunity to think about activities that can be done in your school grounds. Learners could construct models in the classroom and then take them outside for testing e.g. **o-wing gliders** – there is a short **video** made by learners accompanies this activity. **Balloon powered cars** might be another possibility. Further examples include observing shadows and making a sundial, **photo-orienting**, **Investigating bubbles**, bug hunts and making a simple **science pocket book** or even **making paper** Are there activities that you might normally do in your classroom that could be done equally well outside whilst keeping learners socially distanced? Examples include, **Launching a Rocket Mouse**, **Making a wormery and observing worms**, **Exploring transpiration in plants** using food dye and white flowers - this investigation works well with daisies collected from the school grounds. Investigating chemical reactions with vinegar and bicarbonate of soda could also be carried out in the playground rather than in the classroom.
14. You might consider introducing discussion activities with a STEM theme to encourage learners to interact verbally. SSERC have a number of discussion activity resources, developed in partnership with the Primary Science Teaching Trust (PSTT):

A Waste of Space

A Level Playing Field

Let's Talk Plants

Let's Talk Bogs

Let's Talk Environmental Issues

Lesson length

Hands on lessons delivered under these new circumstances may take a little longer than usual to complete, so bear this in mind when planning your day. As well as learners needing additional time to carry out each step of the activity alone, you will require extra time for set up and clearing up.

Spillages

If you are carrying out our **Hydrogels** or **Let's Talk Bogs** activities, there is no need to worry, as in previous guidance, about having resources for your learners to clear up by themselves. Of course, there are good reasons why this should be encouraged but there is no need and teachers or classroom assistants can step in to help with no concern.

Clearing up

As above, there is less concern about proximity and surface cleanliness than previously so it is safe to revert to pre-pandemic procedures where appropriate.

Carrying out practical work

1. While it is still sensible for all equipment for STEM activities to be clean before it is used, for a variety of reasons, the requirement for thorough cleaning/sanitising or quarantining for 72 hours is no longer in place. Where possible, it is prudent to clean items before re-use but if this would limit what is being taught then it does not need to happen.
2. If possible, using recyclable equipment/resources that can be placed in the appropriate waste at the end of the lesson is still a good idea. One way might be to organise children to put disposable items in the correct bin, one child at a time as they leave the classroom. Recycling bins will need to be emptied frequently.
3. Think carefully about any learners with additional support needs that would ordinarily have extra support during a hands-on science or technology activity. While support for learning practitioners will be able to provide direct assistance if this assistance is likely to be prolonged, you should consider an alternative lower risk activity. If the activity is essential to learning and extended then make sure the support for learning practitioner has any requisite PPE.
4. Higher risk activities that may require extensive supervision or direct adult support as a matter of course do not need to be strictly avoided now but they may well be better avoided for the time being. For example, investigating burning, or making a fire extinguisher, normally requires an increase in the amount of supervision, i.e. more adults in the room.
5. If an accident occurs, follow your school's guidance. Make sure you know this guidance before the lesson and how to implement it. You will need to talk to the class about what to do if an accident happens during this new way of working. What you say will depend upon on the activity you have planned.
6. Taking learners outside is a great choice, but don't forget that. It is still important to reduce interactions between learners and maintain distance where possible as if you were indoors.

Classroom management during a hands-on activity

The following advice is now merely an example of best practice – we are keeping it in the guidance for those who wish to ‘go the extra mile’. If there are bits of it you can incorporate into teaching without it being disruptive then we recommend you do but if there are not, then it does not matter.

Before the lesson:

1. Setup any equipment at the tables before the lesson.
2. If learners are working individually setup equipment in individual trays. This will help speed up setup and clearing away and the trays will contain any spills.
3. If water is required for the activity, then this should be provided as part of the equipment. (Whether work is taking place as a group or as individuals). Learners should not leave their table to collect anything. Where it is not possible to do this then any access to, eg a tap, needs to be controlled by the teacher to minimise risk.
4. Adults will need time prior to and after the lesson for setting up/clearing up.

During the lesson:

5. Teacher demonstrations may be required for learners to access the activity. Learners must not leave their tables to crowd round a demonstration table, so make use of data projectors and digital cameras / visualizers/video clips to project what is being demonstrated.
6. Use large visual aids to support instructions. Within this highlight/incorporate safety messages, for example, step by step PowerPoint slides on a whiteboard.
7. If at any point during the lesson, you feel that the activity isn't working as you had planned or something is about to go wrong, for example, an accident may happen (even though nothing has yet), then stop the activity. This might mean stopping an individual child or stopping the whole class. Ordinarily you would intervene, but now this is much harder/you can't, so you need to take alternative steps. If necessary, swap to a pre-planned written/oral activity.

End of lesson:

8. Once the activity has finished, learners should place all equipment back into their tray. An adult must clear the trays away when the learners have left the classroom, and then carry out any cleaning of equipment as required by your school (see Risk Assessment).
9. If your planning has highlighted that clearing up will need to be done. Think about how this will happen and how long it will take.

Opportunities to extend learning using simple hands-on activities

None of this means you will have to compromise on learning outcomes or experiences. Use the time to extend the learning in other ways, simple or low risk activities present new and exciting opportunities. For more ideas about making the most of hands on activities during this time keep up to date with the SSERC website and social media posts.

If you have any questions about practical STEM activities in and out of the classroom contact primary@sserc.scot