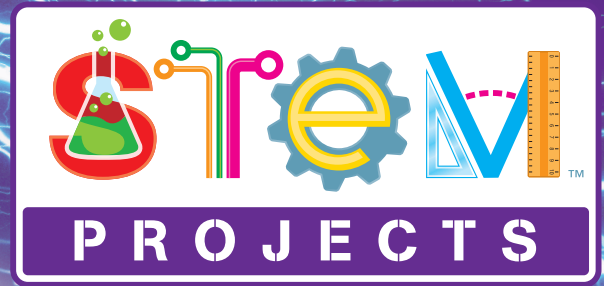


INTRODUCTION TO STEM

What is STEM Education?

STEM learning is the integration of science, technology, engineering and mathematics in an effort to increase pupils' interest, engagement and awareness in these areas. These disciplines are deeply intertwined in the real world and it has been shown that this approach is one of the most effective ways in which pupils learn. STEM also encourages pupils to work in team environments using communication, collaboration and problem-solving skills.



*Explore how to use STEM Projects
in your classroom ...*

Allocating Time to STEM Education

Each project is expected to take up to six hours to complete, depending upon pupils' abilities, prior learning and pace of working. There are many successful models of how to deliver STEM education. One such model is to allow a period of time each week for pupils to work on their STEM project.

Another model is a dedicated STEM Day in which the class, year group or whole school take part in focused STEM learning. STEM days raise the profile of STEM education in the school and give an opportunity for parents and other family members to work alongside their children on these projects.

To make the most of this resource, teachers can use some of the projects to focus on one aspect of STEM learning. Pupils could be challenged to create only a design for the project. Alternately, if all the resources are prepared in advance, pupils can focus solely on the making process. This can be useful to teach specific skills and techniques.

Building Resilience

Additional time can be allocated to encourage pupils to persist with challenges, evaluate and make corrections to their designs. However, be mindful not to let projects drag on, as pupils may lose interest in future STEM projects.



PLANNING, TEACHING AND ASSESSING

Planning

Choose projects from the area of science that you are teaching. Projects in each section either apply the science knowledge required for that year level or are designed to consolidate previous learning and allow pupils to apply their previous knowledge and understanding in science.

The final project in each section is designed to be a longer-term or more involved project. Careful planning and project selection over the course of a year will ensure that all strands of the design technology national curriculum are also covered in depth. To help in this process, each overview card references the different design technology strands taught in each project.

Differentiation

Many pupils will experience barriers to learning that might prevent them from achieving the learning goal. Differentiation allows teachers to really challenge pupils to solve problems whilst supporting them to overcome barriers in their way. For many projects, pupils are able to choose the level of detail they put into their project. Mixed-ability groupings will assist pupils to complete the task without requiring the project requirements to change. Careful grouping of pupils will allow higher levels of support and adult guidance.

Assessment

Assessment should be about the process and the product. It should focus on the pupil's application of their scientific knowledge and enquiry skills, design technology skills, digital technology skills, mathematics knowledge and interpersonal skills. Whenever possible, pupils should evaluate the finished product against the task and the design criteria on each project card. Pupils can be supported with peer and self-assessment activities. Pupils should be encouraged to be reflective about both the designing and making process and apply what they have learnt to further projects.

CLASSROOM MANAGEMENT

Grouping Pupils

It is recommended that:

- pupils work in mixed-ability groupings to allow pupils to use their personal strengths and weaknesses to assist group members or seek help;
- pupils work in small groups of four to six pupils. There are six copies of each card to allow up to six groups; and
- as pupils become more experienced in STEM projects, they should experience different roles, including leadership, within the mixed ability groups.

Learning Support

It is recommended that:

- during STEM projects, adults are used to support pupils in reading the information on the cards;
- as pupils become more experienced, adult assistance is used to guide pupils with how to go about finding solutions and to prompt pupils with the design process and conflict management strategies;
- when pupils are using equipment that could be potentially hazardous, adult supervision is always considered; and
- safety considerations are to be discussed with pupils prior to and during each project.

RESOURCE MANAGEMENT

Classroom Organisation

It is recommended that:

- a designated area is established to store common materials and resources that pupils may need;
- pupils are reminded about resource management, sharing of resources and sustainability; and
- some materials be pre-prepared, such as materials that require cutting, to help pupils to complete the project within the allocated time.

Organisation of Materials

To ensure success of the projects, it is recommended that pupils have access to:

- stationery items, such as scissors, pencils, rulers and glue sticks;
- art and craft materials, such as PVA glue, paintbrushes, a range of paper and collage materials;
- fiction and non-fiction books relating to the project topic; and
- digital technology devices, such as tablets, computers and digital cameras. (Devices that can scan QR codes are highly recommended).

Specific Materials Required for Individual Projects

Some projects require specific materials and planning ahead is needed for a successful delivery of the project. These materials are easily accessed from school suppliers, food or craft stores. Certain resources, such as playdough, can be made from recipes that are found by conducting a search on the Internet.

DESIGN PROCESS



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