Teacher Guidance – Design and Technology Lessons

Contents

General guidance: 2

Introduction to the lessons 2
The Energy House project brief 2
Alternatives to the flat pack model 3
Project timings 3
Project direction 4
Alternatives to the formal lesson plans 5

Lesson specific guidance: 6

Design and Technology Lesson 1 - Introducing the Energy House project 6
Design and Technology Lesson 2 - Planning the Energy House 6
Design and Technology Lesson 3 and 4 - Designing the features for the Energy House AND making the features for the Energy House 8
Design and Technology Lesson 5 - Fitting the features and presenting the Energy House project 9
General guidance:

Introduction to the lessons

This set of lesson plans has been developed as part of a series of cross curricular lessons on Energy, funded by the SEACS project (Sustainable Energy Across the Common Space).

Your school may be running the full suite of lessons or selecting individual lessons, activities and learning outcomes to support previously planned work programmes. If your school is running the programme in its entirety then ideally the Design and Technology lessons will run after the completion of the 4 Science lessons. They can be taught before, after or alongside activity plans for Foreign Languages (French), PHSE and Extra-Curricular projects.

To encourage ownership of the design project, the brief is designed not to be overly prescriptive. Pupils and teachers are encouraged to decide as a class how they will proceed to meet the project brief, dependent on their interests, abilities, skill sets required and time available. See guidance on ‘Project Direction’.

Throughout this guidance document and the lesson plans the words ‘prop’, ‘feature’ and ‘concept’ have been used interchangeably to describe how pupils may visually represent an element of energy good (or bad) practice, or items added to the model to add realism or geographical context.

The Energy House project brief:

- To research both physical and behavioural improvements that can be made to a home to increase it’s energy efficiency.
- To assemble a scaled model of 2 semi detached houses*.
- To design and build a range of model features and appliances to demonstrate good energy efficiency practice.
- To install these features in your model houses to visually represent energy efficiency measures that can be applied in the home.
- To provide supporting information to explain the features in the model house and how they save energy in the home.

*If your school is an official participant in the SEACS project you will have been provided with a flat pack scaled model of 2 semi detached houses – referred to as ‘the shell’ throughout this guidance. The shell is approx 80cm x 60cm x 100cm in size and instructions on how to assemble it are provided with the materials. For those schools not officially participating in
the SEACs programme, guidance on how to replicate the design or alternatives to using the flat pack model can be found overleaf.

Alternatives to the flat pack model

1. Plans for the flat pack models can be made available so that schools can replicate the shell using their own resources*.

2. Schools can be directed to the flat pack provider to be sent a shell at cost*.

3. Using large cardboard boxes, or similar as the house shell (this would add an additional design element to the project as well as requiring pupils to more keenly consider the maximum ‘load’ capacity of the model when designing props).

4. To modify the whole suite of lesson plans to fit better with time restrictions, access to necessary resources, associated costs and how the school runs their KS3 DT lessons, potentially eradicating the need for a shell (see alternatives to the formal lesson plans).

*For option 1 or 2 please contact Doe Fitzsimmons at: dorothee.fitzsimmons@devon.gov.uk

Project timings

You will note that the build of the house shell is not included specifically in any lesson plan. This is because teachers may want to consider a number of options:

• To take on the shell assembly (or get a small group of pupils to) prior to lesson 1 so that students can immediately visualize the project;
• To build the shell as part of lesson 2 in order to assist students in being able to identify and solve issues concerning space and prop size;
• To build the shell as part of lesson 3 or 4 so that it can be assembled by those pupils who finish their workload earlier than others, as a filler.
• To allocate the building of the shell to a particular group of students, based on their skill sets, work preferences, or the level of supervision they require.
• To modify the whole suite of lesson plans to fit better with time restrictions, access to necessary resources, associated costs and how the school runs their KS3 DT lessons, potentially eradicating the need for a shell. See ‘alternatives to the formal lesson plans’.
The shell must be built prior to lesson 5. It is suggested that a maximum of 3 pupils are assigned to building the shell. How long the assembly takes will vary according to the skill levels of those building it and the number of people involved, however, it is expected that it could be easily constructed within the course of 1 lesson.

Lesson plans 1 and 2 have suggested timings for activities, although teachers may wish to alter these (and potentially run the activities over more lessons) to suit the size and pace of learning of a particular class group.

Lesson plans 3 and 4 do not have allocated time frames for the activities, only objectives that need to be met before progressing to the next lesson. This is because different pupils will require different amounts of time to produce designs and build their props. As such, teachers can choose to run these areas of the project over as many or few lessons as they feel suitable.

Lesson 5 (fitting features and presenting the house model) also does not have time allocations. This is because different classes will have a different amount of props and different group sizes. Again, it can be run over as many or few lessons as the teacher feels suitable.

Project direction:

You will need to decide how best to convey the message of ‘energy efficiency good practice’. Below are some prompts to help teachers and students reach a decision.

You may choose to:

- Fit both houses with energy efficiency features to incorporate as many ideas as possible.
- Use one of the houses to visually represent energy efficient features and practices and one to show contrast and portray energy inefficient features and practices.
- Use one house to show features that could be fitted in an old house and one to show features that could be fitted in a more newer building (this may well require further research into how the age of a building affects which measures are appropriate).

When deciding on a list of final features to be incorporated into the house there will be a number of important design issues for the class to consider. Further information on these is included in lesson plan 2 and the detailed guidance for lesson 2. Beyond this there are other key considerations which the teacher should decide upon prior to running this suite of lessons. These include:
• How to inspire and engage pupils with the project. It is acknowledged that KS3 pupils may liken the project to building and fitting a doll’s house. Thought should be given to how the project brief is conveyed in order to ensure students buy in (particularly with reference to adding features to improve the models realism, such as people, furniture, brick patterns).
• When the ‘shell’ will be built. Please refer to ‘project timings’ for further detail.
• How to ensure an appropriate workload for each pupil when assigning props/features to be built (lesson 2). Suggestions to aid this decision making are included in the lesson specific for lesson 2.
• How you will plan your time, space and resources to allow all the features to be built (lesson 4). There are suggestions to aid timings in the lesson specific guidance for lesson 3 and 4.
• How you will plan your work space to allow all props to be fitted (lesson 5). It is suggested that a maximum of 3 pupils should ‘fit’ the features into the model at any one time.
• Health and safety when working with tools and materials.

Alternatives to the formal lesson plans

These lesson plans cover a range of KS3 DT skills including: Resistant Materials (material choices and build of the shell and props) and Graphics (producing sketches and accompanying information), but can also be adapted to suit the school. Teachers may choose to include some or all elements of the lesson plans, depending on time restrictions, access to necessary resources, associated costs and how the school runs their Design and Technology lessons, for example:

• Pupils may not produce accompanying information in their Design and Technology lessons and focus entirely on the design and build. Supporting information could instead be completed in other subjects (eg. Science, PHSE, Citizenship and/or French).
• Teachers may choose not to build the house model at all, but to sit these lessons entirely within Graphics, getting the pupils to work individually to produce detailed house plans/diagrams featuring different energy efficiency improvements.
Lesson specific guidance

Design and Technology Lesson 1 - Introducing the Energy House project

This lesson provides an introduction to the overall cross-curricular project and how the Energy House lessons sit within it. The lesson aims to introduce the pupils to the subject of energy in the home and to aid them in identifying energy saving measures and behaviours that can be incorporated into houses to reduce energy consumption.

Resource ‘DT1a Introduction to energy in the home presentation’ details key learning around electricity and heating use in the home. This is intended to provide an overview of energy efficiency in the home and to initiate discussion around energy saving measures that could be visually demonstrated in the model.

Resource ‘DT1b Teacher prompt sheet of potential energy efficiency measures’ is provided to further this discussion and allow the teacher to guide pupils to identify a wide range of energy efficiency measures that could be incorporated.

An optional homework idea is suggested to move the project forward after lesson 1. If homework is not set, teachers will need to prepare some additional information prior to commencing lesson 2. This includes providing energy/money saving information for the measures and pictures for pupils to refer to. If lesson 2 is run directly after lesson 1 the teacher may use ‘DT1b Teacher prompt sheet of potential energy efficiency measures’ to pre-empt the likely measures.

Design and Technology Lesson 2 - Planning the energy house

Following on from lesson 1, this lesson looks at energy efficient features in the home in more depth and requires the whole class to work together to identify energy efficiency (and other) measures to be included in the house shell. The lesson focuses on identifying and resolving design issues that may arise from visually representing these features within the house shell.

Things for the pupils to consider during the class discussion on which props to incorporate may be:

- Whether features are designed to scale for realism, or oversized to allow for detail.
- The space within the model and how features will fit in with each other. Where each feature will be placed during fitting.
• How/whether features can be visually represented clearly.
• What materials and tools may be available already? Will anything need to be sourced from outside of the school in order to build the chosen props? Are there issues sourcing these materials/using these tools?
• How will features be fixed in place? Do they need to be fixed?
• Will you use ‘other’ features to add realism to the model?
• If the class are designing contrasting houses – e.g. one good practice house and one bad practice house or one old building, one new building, they should also consider how to demonstrate these differences (e.g. behaviour – a model person wearing a jumper in one house and not in the other? How do they show one house has a cavity and the other does not?).
• Will environmentally friendly materials be incorporated into the project build as an additional requirement of the design brief (e.g. reusing waste materials, building from recycled or recyclable products).

A key consideration for teachers is to ensure an appropriate workload for each pupil when assigning props/features to be built. This is something that the teacher should be thinking about during the class discussion, in order to allocate each pupil with a workload for lesson 3.

Suggestions for how this could be done include:

• pairing pupils with one taking responsibility for designs to be used in ‘Lesson 5: fitting the features and presenting the Energy House project’ and the other leading on the build – including researching appropriate materials;
• Considering prop size and potential complexity of the build. Larger or more complex props may be able to be built in larger groups.
• Placing a focus on making the model realistic and so dividing the class into those who work on producing energy features and those who work on realistically representing a house (looking at brick patterns, wall paper, recreating common household furnishings, model people, gardens etc). This could ensure each student could take ownership of one prop.
• Replicating the design for the outer shell provided so that pupils can work on several models rather than one as a whole class. A less costly option would be to design the models using large cardboard boxes as the house shell, also necessitating greater consideration of maximum load capacity.
• Incorporating visual characteristics of traditional buildings in the local area (e.g. thatched roof or stone walls). This can provide more bulk to the project and would potentially require additional research, make it easier to accommodate larger classes*.
*Schools choosing to include the French Language element of the project may be particularly keen to use this idea as the DT project will then more directly relate to the French lesson plans (e.g. describing their home) and increase emphasis on cross cultural learning by demonstrating differences in buildings resulting from locality.

Teachers may also wish to consider the skills, abilities and preferences of individual pupils when allocating features to be designed and built – for example, the speed at which different pupils work, their need for supervision and guidance etc.

The lesson will require the teacher to allocate preparation time prior to lesson 3 (highlighted in on the lesson plan). This will be to produce a handout summarising the final selection of props and agreed solutions to problems, as identified in class discussions. Props should also be allocated to individual students or groups as appropriate. Ideally this preparation will be done by the teacher at the earliest convenience after lesson 2 and the handout summarising the class discussion disseminated back to the class well in advance of lesson 3. This would allow pupils to spend a good amount of time on both the planning and design of the model house project during class time. It will also allow for pupils to complete homework (featured at the end of the lesson 2 plan) that will aid them in the research stage.

It is appreciated that this will not be feasible for all classes running this series of lessons and so the allocation of props and dissemination of notes summarising the class discussion have been included again at the start of lesson 3 plan, in order that individual teachers can decide where it is most appropriate to sit this activity.

**Design and Technology Lesson 3 and 4 - Designing the features for the Energy House AND making the features for the Energy House**

Lessons 3 and 4 have been incorporated into one lesson plan. This is because the lessons feed into each other, are less distinct from each other and are less prescriptive than the other lessons.

In lesson 3 pupils will prepare final designs of their allocated props and plan for the build and in lesson 4 they will make their props.

The formatting of these two lessons in one plan also allows for them to be combined, so some students may begin to build earlier than others. This is designed to acknowledge different needs of the pupils; some of whom may need to spend longer planning and others who will require longer to build. However, teachers should recognize that preparation time may need to be written in between the design stage and the build stage in order to allow
time to prepare tools and materials for the build. If this is not possible students should be made aware that they will only be able to use resources that are available at the school.

As stated in the lesson 2 teachers guidance, pupils will ideally have been allocated props and given handouts summarising and allocating the props to build in advance of this lesson, in order to allow the maximum time to design their prop in lesson 3. Completing the homework assignment suggested in lesson 2 will also allow pupils to produce more thoughtful designs.

**Design and Technology Lesson 5 - Fitting the features and presenting the Energy House project**

Lesson 5 has two main objectives (‘fitting’ and ‘presenting’) allowing one group at a time to fit their features whilst the other groups prepare presentation materials.

Much of the work prescribed in this lesson plan can be started in earlier lessons if students complete their other work more quickly than anticipated. This should accommodate pupils building props that require less time to design and/or build students variable skill levels and need for supervision.

Designs, mood boards and written notes from the previous Energy House lessons should be used to help inform the presentation of the final Energy House.