



Lesson Plan: Engineering

Time required for this lesson

60 minutes

Aim of the lesson

To introduce students to the Engineering occupational sector.

Learning outcomes

By the end of this lesson students should:

- have an understanding of the different types of engineering jobs and the skills and qualities required to carry out these jobs
- have had some practical experience of what skills and qualities are required to work in Engineering through carrying out a Bridge Building activity
- have a greater awareness of what is happening nationally and locally in the area of Engineering

Resources required for this lesson

- 'Working in Essex, Southend and Thurrock – Engineering' leaflet obtained from www.stepon.org
- Match the Job Title to the Job Description Worksheet and Answer Sheet
- Paper Bridge Worksheet
- Engineering Quiz and Answer Sheet

Introduction

Explain to the students that this collection of labour market leaflets has been produced by Connexions and the Learning and Skills Council. It is intended to be used as an information, advice and guidance resource to help them understand more about the trends in the labour market in Essex and to support the introduction of the new 14-19 Diplomas. Its ultimate aim is to help students with their decision-making regarding their future career plans. This lesson is all about the occupational area of Engineering and can support students who are thinking about doing the Diploma in Engineering.



Activity 1

Match the Job Title to the Job Description (15 minutes)

Worksheet: Match the Job Title to the Job Description and Answer Sheet

Ask the students to work in pairs. Hand out the worksheet 'Match the Job Title to the Job Description'. Ask the students to look at the Job Descriptions on the worksheet and match them to the Job Titles in the table.

Once they have done this ask the students to discuss with the person sitting next to them any skills and qualities that are required to carry out each of the jobs and make a note of them on the worksheet.

After 10 minutes get the students to feed back their answers. You can use the Answer Sheet to give out the correct answers.

Have a discussion with the class about how diverse Engineering is and that this is just a handful of the different jobs in the Engineering sector. Ask the class if they know anybody who works in Engineering and what that work involves.

Discuss with the students if any of them are considering a career in Engineering and the skills and qualities that they have that will help them in this area of work.

Activity 2

Paper Bridge (25 minutes)

Worksheet: Paper Bridge

Divide the class into groups of three or four people. To carry out this activity each group will need:

- A sheet of plain paper
- 5 paper clips
- Ruler
- Scissors
- 2 books
- At least 100 pennies or other small weights

Have a short discussion with the class asking them to describe the bridges they have seen locally. Discuss with them why we need bridges? What do they look like? What qualities should a bridge have?

Explain to the class that in their groups they have to make a bridge that can hold 100 pennies, using one sheet of paper and up to five paperclips. The paper bridge must span 20 centimetres and the sides of the

bridge will rest on two books and cannot be taped or attached to the books or the table.

After all the bridges have been built get feedback from the class on how they found this exercise. For example what influenced the design for their bridge, are their similarities in the design of the strongest bridges. Talk about what skills were used to complete the bridge (e.g. design skills, teamwork, problem solving); did different people in the group display different skills; did they think that these skills would be required for working in the Engineering sector.

Activity 3

Engineering Quiz (15 minutes)

Worksheet: Engineering Quiz Worksheet and Answer Sheet

Pupils will need a copy of the 'Working in Essex, Southend and Thurrock – Engineering' leaflet to be able to find the answers to the quiz.

The pupils can work on their own or in pairs to complete the quiz.

Give the pupils 10 minutes to complete the quiz and then spend the last five minutes going through the answers.

Plenary (5 minutes)

Working in pairs ask the students to come up with a statement which describes what Engineering means to them. Once they have done this ask for volunteers from the group to read out their statements.

End the session by going back over the aims and learning outcomes of the lesson with the students and asking them if they have any questions about anything that they have done.

March 2009 Copyright © 2009 Essex County Council. All rights reserved. All information correct at time of issue.

Activity 1

Match the Job Title to the Job Description – Worksheet

Read the Job Descriptions below and match them to the Job Titles in the table. The first one is completed for you as an example.

Discuss with the person sitting next to you any skills and qualities that are required to carry out each of the jobs and make a note of them below.

| Job Title | Job Description | Skills and Qualities |
|---------------------------|-----------------|---|
| Civil/Structural Engineer | B | an interest in structures like bridges or dams and how they are built, communication skills and the ability to work in a team, good problem-solving skills, technical skills. |
| Aeronautical Engineer | | |
| Automotive Engineer | | |
| Broadcast Engineer | | |
| Chemical Engineer | | |
| Design Engineer | | |
| Electrical Engineer | | |
| Manufacturing Engineer | | |
| Mechanical Engineer | | |

Job Descriptions

- A.** Plans, designs, installs and operates chemical plants producing products such as pharmaceuticals, fertilisers, fuels and petrochemicals.
- B.** Helps to design and build major engineering projects, such as bridges, roads, railways, airports and power stations.
- C.** Works on the equipment used to generate power and supply it to customers.
- D.** Responsible for the design, installation and operation of plant, machinery and other mechanical equipment.
- E.** Works in the motor manufacturing industry in designing, testing and production of vehicles.
- F.** Looks after the quality of the sound and pictures for TV and radio programmes.
- G.** Uses engineering and management skills to plan and control manufacturing systems.
- H.** Designs products that we use day to day such as cars, aircraft, computers, phones and televisions.
- I.** Works on the design, testing and production of aircraft, missiles and satellites.

Activity 1

Match the Job Title to the Job Description – Answer Sheet

| Job Title | Job Description | Skills and Qualities |
|---------------------------|------------------------|---|
| Civil/Structural Engineer | B | an interest in structures like bridges or dams and how they are built, communication skills and the ability to work in a team, good problem-solving skills, technical skills. |
| Aeronautical Engineer | I | thoroughness and a sense of responsibility, normal colour vision (for certain roles), excellent maths and ICT skills, teamwork, leadership and communication skills, the ability to think analytically and creatively. |
| Automotive Engineer | E | An interest in the design and performance of motor vehicles, creative and problem solving skills, skilled in the use of ICT, can pay great attention to detail, can take an idea through to a completed design, ready for model-building and testing. |
| Broadcast Engineer | F | communication and teamwork skills, enthusiasm, voluntary or amateur experience, computer literacy. |
| Chemical Engineer | A | a flair for maths and science, an understanding of engineering principles, to be interested in a challenge, problem-solving, computing and analytical skills, good communication and teamwork skills, to pay meticulous attention to detail. |
| Design Engineer | H | to be able to think logically and creatively, technical and creative skills, the ability to produce specifications and drawings, to be able to work in a team, excellent communication skills, ICT skills. |
| Electrical Engineer | C | to be good at maths, technology and science, ICT, communication, problem-solving, analytical and team working skills. |
| Manufacturing Engineer | G | a good understanding of basic scientific principles, problem-solving skills, computer literacy, good communication skills. |
| Mechanical Engineer | D | well-developed ICT skills, as much of the work is computer-based, high levels of numeracy and an interest in science and new technologies, practical ability, problem-solving and teamwork skills. |

Activity 2:

Paper Bridge - Worksheet

Can you build a bridge that holds 100 pennies, using 1 sheet of paper and up to 5 paper clips?

Your paper bridge must span 20 centimetres. The sides of your bridge will rest on two books and cannot be taped or attached to the books or the table.

What you will need

- plain paper
- 5 paper clips
- ruler
- 2 books or blocks
- at least 100 pennies or other small weights
- scissors

Try it out

1. Discuss possible ideas with your group before you start building. What can you do to the paper to make it stronger? When you have decided on a design, construct your bridge.
2. Place the bridge across two supports that are 20 cm apart. Remember that the space below the bridge must be clear to allow boats to pass!
3. To test your bridge, load it with pennies one at a time, until it collapses. Record how many pennies your bridge supported.

Activity 3:

Engineering Quiz - Worksheet

Using the 'Working in Essex, Southend and Thurrock Engineering' leaflet have a go at answering the questions below.

1. How many people are employed in engineering manufacturing establishments in the East of England?

2. What are the main skills gaps reported in London and the South East?

3. How will technological change have an impact on the Engineering sector?

4. What is the annual average salary for a 'Production and Process Engineer'?

5. Name some of the skills that would be useful for working in the Engineering sector?

6. When will the Diploma in Engineering be available from?

7. How many year 11 school leavers started full-time employment or work based training in the Engineering sector in 2006?

8. What is the website address for the Engineering and Construction Industry Training Board?

Activity 3:

Engineering Quiz – Answer Sheet

Using the 'Working in Essex, Southend and Thurrock Engineering' leaflet have a go at answering the questions below.

1. How many people are employed in engineering manufacturing establishments in the East of England?

152,000

2. What are the main skills gaps reported in London and the South East?

London – basic metals and transport equipment
South East – basic metals, aerospace and metal products

3. How will technological change have an impact on the Engineering sector?

It will maintain a demand for professional and technical skills and a decline in craft and operator skills.

4. What is the annual average salary for a 'Production and Process Engineer'?

£33,243

5. Name some of the skills that would be useful for working in the Engineering sector?

Good at communicating ideas and theories, attention to detail, interest in craft design and technology

6. When will the Diploma in Engineering be available from?

September 2008

7. How many year 11 school leavers started full-time employment or work based training in the Engineering sector in 2006?

176 (149 Essex, 8 Southend, 19 Thurrock)

8. What is the website address for the Engineering and Construction Industry Training Board?

www.ecitb.org.uk

Notes