Lead Lessons

Exercises to introduce new skills and ways of thinking

Teamworking

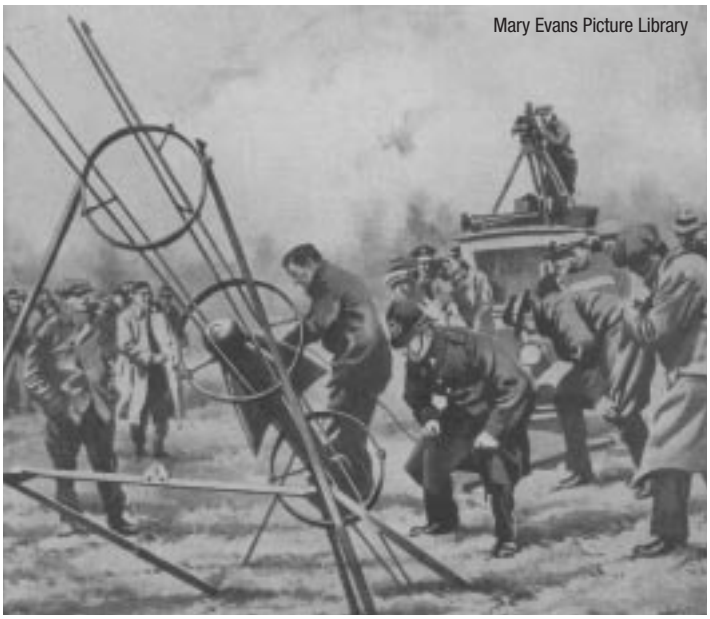
Introduction

This is an exercise designed to encourage students to work collaboratively in solving a problem, while at the same time reflecting on which aspects of effective teamwork they need to develop.

Additional information regarding rocket post in 1930s

Scarp – Rocket post

The tiny island of Scarp now lies uninhabited just off the coast of the Isle of Harris in one of the most remote corners of Great Britain. But at the beginning of the 1900s Scarp had a thriving population who made a living crofting the land and fishing the local seas. In January 1934 Scarp hit the headlines when a young mother couldn't get a message to her doctor on the mainland and ended up giving birth to twin daughters on separate islands and two days apart.



Mary Evans Picture Library

When news of the twins' dramatic birth reached the ears of a German rocket inventor, Gerhard Zucker, he travelled to Scarp intent on solving the island's communication problems. His solution was air mail – delivered not by aircraft but by rocket. In July 1934 Zucker made two unsuccessful attempts at firing his rocket mail between Scarp and Harris.

Reproduced from www.bbc.co.uk/coast

Context

A newsflash announces that rocket post is to be reintroduced for outlying Scottish islands. (This was in fact actually used in 1935 in the Hebrides.) Each team of 4–5 students needs to build a rocket out of the available materials.

- 5 x plastic 35mm film canisters with lids
- Alka-Seltzer tablets
- paper plate
- toilet-roll tube
- water.

Additional materials

- Sellotape
- kitchen-roll tube
- extra Alka-Seltzer tablets.

So that you understand the process, we illustrate the way this works on page 24 but obviously you won't be telling students this as the purpose of the activity is to give them practice in solving the problem. In brief the 'rocket' works when the tablet is put into the film canister with some water and then sealed. It's then placed upside down in the toilet-roll tube with the lid on the base of the canister. The tablet will fizz and build up pressure. When the canister blows off from the lid it 'shoots' up the tube and 'flies'. The paper plate acts as a base.

Health and safety note

Use of safety goggles is recommended and you should instruct students to stand back when the film canister is at lift off. The goggles may be borrowed from the DT and/or science departments.

Task:

1. Ask for one person in each group to come up and collect items 1–5 one at a time (all the 1s, etc.). Give all the 1s a film cannister and a slip saying what it is for. Repeat with 2s, etc.

1. **plastic 35mm film canister with lid**
   Forms the body of the rocket and contains the fuel. When the lid is put on the cannister is placed upright, resting on the lid at the base
2. **Alka-Seltzer tablets**
   The fuel source – only activated in the presence of water. N.B. Can only be used once
3. **paper plate**
   Provides a stable platform for the rocket launcher
4. **toilet-roll tube**
   Acts as part of the rocket launcher – and guides the rocket upwards on lift off
5. **water**
   Activates the fuel source. Added at last moment before lid is attached

Additional materials

6. **Sellotape**
   Use to make launcher self supporting
7. **kitchen roll tube**
   Used to make bigger launcher
8. **extra Alka-Seltzer tablets**
   To provide extra launches or to be used in multiples to provide more thrust

2. When the group is re-assembled, explain the group task and time-frame.

   Explain first task is to explain to each other what their component is and what it is for.

   As a group they must decide on the order in which they are going to use their components, how they will be assembled and who will do what.

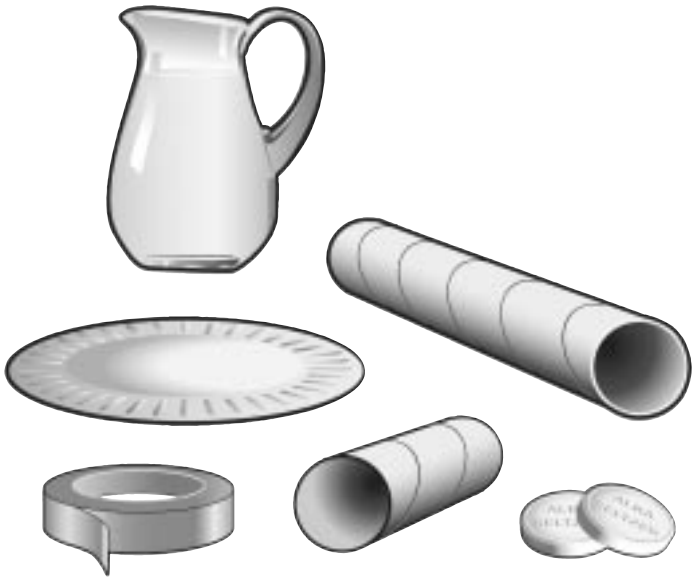
   Get groups to conduct the experiment (allow at least two attempts before stopping whole class).

   Then ask the following key questions:

   - 'Which rocket was best and why?'
   - 'What criteria were you using to judge the best efforts?' (e.g. height, etc.).

3. Explain they have one more chance to make their rocket better. What will they change? Offer options if required – indicate availability of extra sellotape to secure rocket base, extra tablets, more water, kitchen-roll tube, etc. How will they know if it's better?

4. Conduct experiment – which rocket was best and why?



Debrief

- Which rocket was the best and why?
- Were the success criteria agreed beforehand?
- Are two tablets best if they cost £1 million each?
- Why was it important to talk to each other?

5. Working in groups ask the students to discuss which of the following attributes they think they exhibited in their work together?
   - Energy
   - Motivation
   - Creativity
   - Openness
   - Bravery
   - Self-esteem
   - Problem-solving
   - Flexibility.

6. Ask students to write down examples of when and where these strengths were evident in their work and which group members displayed them. Which do they believe to be most important:
   - in this experiment
   - in life in general
   - in the workplace?

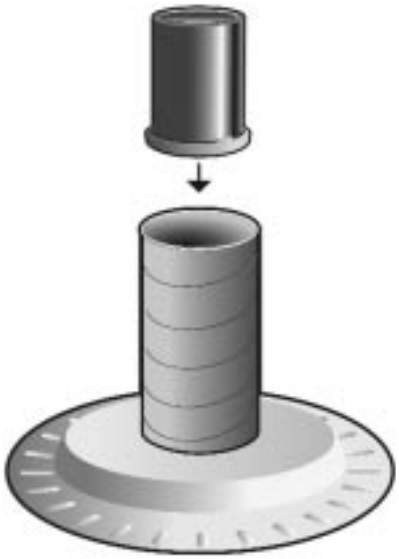
   Collect comments and suggestions and invite members of the class to discuss them. Point out that these are all key employability skills. In a fast-changing job market, one job for life will be a rarity and the flexible, creative candidate will have a distinct advantage. The ability to take risks, learn from experiences and problem-solve will help them develop in any career.

The rocket post process

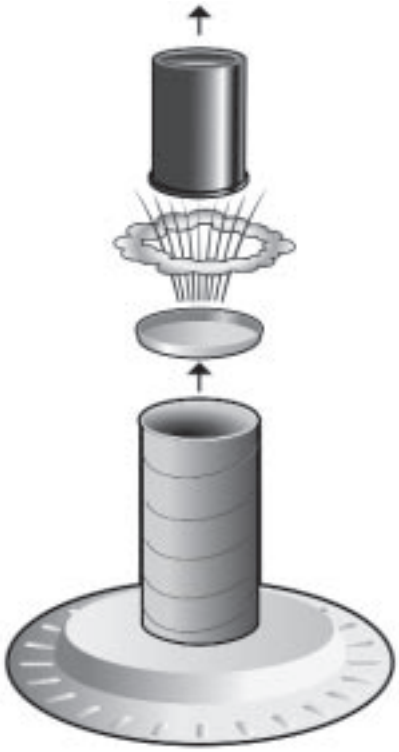
1. Put Alka-Seltzer tablet into film canister

2. Add 10 ml of water into the film cannister and quickly place lid on tightly

3. Invert sealed film canister with tablet and water inside and drop into toilet tube which has been positioned on upturned paper plate



4. Stand back as rocket fuel ingnites and canister is blown up clear of the lid and the tube



Problem-solving

Introduction

The exercise involves six 'thinking hat' colours, which are assigned different thinking characteristics that the wearer must adopt in role. This is a very useful way of anticipating the widest variety of responses to a new idea or problem to be solved. It also helps students become aware of the range of valid opinions outside their own thinking – a first step on the road to respecting the thinking of others. By looking at problems from different angles students are more likely to suggest solutions that best fit the situation and are less likely to feel stuck. This is because they will have a technique to develop their lateral-thinking abilities.

Context

Royal Mail has asked you to come up with some innovative thinking around their problem of how to get mail to a remote island. They have several options including: boat, rocket, cable, pipeline and helicopter.

Resources

Thinking Hat sheets (see *Resources* at the end of this section). Each group will need one of each sheet.

Thinking Hat summary sheet (see *Resources* at the end of this section).

Task:

1. Using the thinking hat construction sheets (see *Resources* at the end of this section) each team should make six hats and decorate them to reflect the colours and characteristics explained in the summary sheet.

2. Assign each of the five groups an option from the possible ways of getting mail to the island.

   A. boat

   B. rocket

   C. overhead cable

   D. pipeline

   E. helicopter

   However, don't inform the groups of their assigned option at this stage.

3. The members of the group should analyse the advantages and disadvantages of all the options by each assuming a different thinking hat (and therefore style of thinking) one at a time so that a full complement of yellow, black, green, blue, white and red thinking hat styles have been considered by each group.

   Taking each of the five proposals A–E listed above one at a time, and using the summary sheets (see *Resources* at the end of this section) to record their responses, the group should explore what they think of each idea.

4. Once the group have assessed all five methods of mail delivery, inform them of the option assigned to their group. They then need to offer reasons why this is the best way to solve the problem, even though they many not actually think it is the best way. Part of the purpose of this task is to learn to argue in support of points of view that are not their own

5. *Student presentations.* Each group should be asked to present one of the methods, promoting the most positive aspects of the method.

6. At the end of each presentation, the groups listening can ask questions using any of the points raised in their initial 'thinking hats' analysis.

7. As a class they should vote for and against each of the proposals to determine a ranking, identifying one method as the best overall solution.

Plenary

8. Ask the following key questions

   - Are everyone's inputs – even those from the optimists, pessimists, etc. – useful?
   - How do different viewpoints help us come to balanced decisions?
   - What would happen if only one style of thinking dominated?

   Stress that teams are useful for problem-solving when they listen and value each other's opinions. Seemingly negative views can often be useful if they cause an optimistic thinker to stop and consider the implications of their suggestions.

Summary of Thinking Hat strategy

This exercise is based upon the well-known Edward de Bono strategy and a version of it is employed by the National Secondary strategy for school Improvement *'Assessment for Learning' – Whole School Training Materials* DfES 0043-2004 G (see www.standards.dfes.gov.uk).

Asking students to think about issues from different viewpoints helps them practise a form of parallel thinking. This encourages co-operative, co-ordinated thinking. Students lay out all views side by side to consider how to move forward. This helps them separate out the different aspects of thinking, rather than attempting to do everything at once. Seeing things from someone else's point of view means that the solution that is finally derived from the exercise is more likely to be successful and to satisfy a wider audience. This technique is practised here in a hypothetical case but is also seen as a part of the initial planning process for a possible school-based mini enterprise.

Red hat – This covers intuition, feelings and emotions and requires no justification.

Yellow hat – This is the logical and positive hat. It can be used to look forward to positive outcomes, and to find something of value in what has already happened.

Black hat – Black hat thinking is logical but somewhat pessimistic: the hat of judgement and caution.

Green hat – This is the hat of creativity, alternatives, proposals, different and new ideas, 'outside the box' thinking.

White hat – This looks at facts, figures, information needs and gaps.

Blue hat – This is the overview or process-control hat. It looks not at the subject itself but at the thinking about the question.

Grand Designs

Design a Premiership football player

Introduction

In designing a solution to any problem it is essential that we are clear about its exact requirements. This is an 'audience and purpose' exercise where the students are assigned an initial task to select and prioritise before being asked to devise a possible solution to the problem. The challenge is to choose six characteristics from a list of 20 possible attributes. Later they are asked to revise their conclusions in the light of fresh information or a new purpose. The context is football but the lessons learned are applicable to any situation.

Resources

Using the 24 Football Player cards (see *Resources* at the end of this section) make enough sets for all the groups and put the cards in envelopes.

Task:

1. Ask students to get into groups of four to read the characteristics on each card to each other to familiarise themselves with the contents and to promote active listening.

2. Inform the students that any of these characteristics could be useful to a hypothetical Premiership footballer, but they are only allowed to select the six they feel will best enable a footballer to perform at Premiership level. Do not give any more information (e.g. position, club, etc.). They have 10 minutes to discuss and select their six.

Debrief

3. Ask selected groups to read out their responses. Use a scribe to write the range of characteristics on the whiteboard. When more than one group reads out the same characteristic, add tally marks to calculate those that are the most commonly chosen.

4. Ask the following key questions:

    i. Why were the highlighted characteristics thought to be essential?

    ii. Why were some only chosen by one group?

    iii. Could all of these attributes exist in one person?

    iv. Would they have come up with the same set of choices if the player required was:

        a. a striker?

        b. in a team facing relegation?

        c. the captain?

5. *Newsflash!*

   The chairman has just announced that he's really looking for a very experienced goalkeeper who will be capable of also becoming a coach and perhaps the next manager. Ask the students to reselect the cards with this in mind.

Final debrief

6. Ask the following questions:

   - Which factors are now the most important for a Premiership player?
   - Which characteristics might have been on the cards if we were designing the ideal pop star?
   - Think about the attributes you would need to do a new job like a postal worker.
   - Would those attributes be the same in the postal worker's 15th year? Or when they are moving into a position of greater responsibility?

   Point out that we all have some attributes that are easily recognised by ourselves and our friends. Other attributes we have are not as well developed but that doesn't mean we can't improve in those areas. We will need to emphasise different skills and attributes as we move through different stages of our careers.

Lead Lesson 4

All Change

‘Hats amazing!’

Royal Mail has decided to update postal uniforms. In particular, they wish to develop a new hat for the 21st-century postal worker. Groups of five students will create their own versions of a hat to suit the modern postal worker using the following materials.

- Funky foam, felt or sugar paper
- Safety scissors
- Glue/prit sticks
- Coloured markers
- Paperclips
- Paper for planning drawings if required.

Health and safety note

Safety scissors should be used – ask the DT, Textiles or Art department for advice on this.

Task:

1. Tell students that they have to plan a new hat for the modern postal worker. The final hat must not cost more than £5.00 to make. Point out that each item has a cost (e.g. one sheet of funky foam/felt/paper costs £1.00, the use of glue 50p and so on).

2. They should share their ideas as a group. They must assign key roles to everyone in the group. At this stage they should be made aware that they will need to present their final product and explain how its design features match the brief.

3. The group create their new hat. Their first stage is to select the appropriate felt/paper/pens to create their hat. Remind them that the more they use, the more the hat will cost.

Debrief

4. Ask selected groups to display their hats and talk through the design features. They should explain what makes them suitable for the allotted purpose and how much they cost.

5. At the end of this session ‘suddenly’ announce that:
   - a competitor has agreed to produce a hat for £1.50, or
   - that a revised request is for the hat to be suitable for extreme cold, or
   - it should now be able to fit any size of head.

   The cognitive conflict presented at this stage requires them to question their initial thinking and adapt their designs.

6. The students must now rapidly redesign their hat.

7. Final debrief – Ask selected groups to display their hats and talk through the design features. They should explain what makes them suitable for the new requirements and how much they cost.

Plenary

8. Ask students:

   - Which strategies they used to reorganise themselves.
   - Is there something about the way they worked during the second session that was different from the first time?
   - What would they do differently next time?

   Ask students to consider the need to have a clear idea of what the requirements are in order to have a clear idea of what the final product should look like (success criteria).

   Highlight how they have shown adaptability as well as creativity, and relate this to the employability skills required in the modern workplace.

Route-ways

Introduction

This exercise encourages students to evaluate several options for delivery of a variety of items to different places. Cognitive challenge is provided by altering the requirements in Part 5 of the task. This encourages them to cope with change and to re-evaluate their decisions. One of the benefits of working in a group on this task is to learn about delegation of roles and co-operative working. This exercise suggests giving students an assigned role, in order to give them a purpose and, ultimately, a voice in the process.

Resources

- Route-ways rail map and road map of UK (see *Resources* at the end of this section)
- Route-ways costing sheet (see *Resources* at the end of this section)
- You will also need a map of the UK showing the places mentioned in the task and alternative route ways, distances and costs. (You should blow these maps up to A3 size if the groups are to use the completed sheet as a presentation aid.)
- Calculators are also necessary to calculate distances and costs.

Task:

1. Divide the class into six groups of five and give each group copies of the Route-ways maps and Costing sheet. Inform the groups that they should all assume that their starting point for this activity is London. An alternative could be to use the students' home town.

2. Each group should be assigned a destination to find a route to:

   - Plymouth, England
   - Douglas, Isle of Man
   - St David's, Wales
   - Cowes, Isle of Wight, England
   - Aberdeen, Scotland
   - Belfast, Northern Ireland.

3. Assign each group one of the following imaginery items.

   - A heavy package of books
   - A letter inviting a friend to a party in one week's time
   - A letter containing tickets for a concert tomorrow
   - A completed job application
   - An advertisement for a new car showroom
   - A blood sample for medical analysis.

4. Ask each group to:

   - devise a route for their postal item
   - select the appropriate form of transport
   - suggest a possible cost. (They should devise all the routes but will only be expected to comment on one in front of the rest of the class.)

5. For each postal journey they must explain the components to the journey: collection – sorting – transportation – local sorting – delivery, etc. – this could be presented on a large piece of flip chart paper as a flow chart diagram.

   (NB: suggest that the groups take time to assign roles to group members. For example, one to calculate the distances, one to multiply the costs, one to do each of the possible transport modes/routes.

Debrief

6. Ask groups to outline their chosen routes. Ask listening groups to suggest any alternative options and give reasons for their preferred routes.

7. Tell groups that changes in postal charges have been announced. (Choose one of the following reasons.)

   a. Air fuel taxes will double air-fare costs

   b. A new low business rate will mean that all business mail is now half price

   c. A new late afternoon flight will exist between London and Belfast.

   Ask group to suggest amendments to their choices in the light of the new information.

Exemplar – Delivering a letter to from London to Leicester