Primary Science & Technology *Bulletin*

SSERC

Ideas and inspiration for teachers in Primary Schools and S1/S2

> O-wing me, O-wing you ...

> Scotland counts

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O-wing me, O-wing you ... Ahaaaa

Fans of QI may remember the challenge issued by Stephen Fry in a recent programme to make a piece of card fly the furthest. The panellists all produced traditional paper aeroplanes but Fry himself joined the ends of the card to make a cylinder and won the challenge [1].

Figure 1 *- A basic O-wing.*

Using this principle to construct O-wing gliders can provide a fun, engaging activity to challenge learners' understanding of flight as well as providing an opportunity to investigate fair testing.

Fair testing is one of the key inquiry and investigative skills identified in Sciences: Principles and Practice [2] and is defined therein as follows: "fair testing - through identifying all possible variables and then changing only one while controlling all the others".

Making a basic o-wing

You will need an art straw, card and sticky tape. Cut a strip of card, join the ends of to form an "O" and tape to the end of the straw. Repeat and tape the second "O" to the other end of the straw (Figure 1). To launch, simply throw the O-wing, as you would a paper aeroplane. At this stage the sizes of these Os are not important and if you get some variation in those made in your class you may start to see some differences in how these changes affect the flight of the O-wing.

Possible investigations

Just looking at the basic O-wing it is easy to see a wide range of possible variables and learners may suggest others as they start to investigate. For example, change the relative size of the Os (Figure 2), change the length of the fuselage (Figure 3), change the shape of the Os by folding the card so it's square or triangular keeping the dimensions of the card equal (Figure 4).

Despite the number of potential variables they are relatively easy to control. However once learners start to throw their O-wings it is less easy to ensure that the "launch" is carried out fairly. Throwing the O-wing at a slight angle into the air generates an upward force called lift and so the O-wing flies. It is worth allowing learners some time to practise launching the O-wings and agreeing how this should be done in order to minimise variation or "unfairness" in this aspect of the test. It is also the case that some O-wings do not fly in a straight line and so you may need to consider what is to be measured in this test. The obvious thing would be how far the O-wing flies but you could try recording the time the O-wing is in the air and this may result in a different model being the "best" one.

If different groups in the class investigate different variables there is a possibility of setting a challenge to build the "best" O-wing, using what the class has learned. However, repeated testing of the O-wings can result in the art straws breaking and so a stronger fuselage may be needed for this. We have used 3 mm dowelling as an alternative fuselage.

Figure 2 *- Different size Os.*

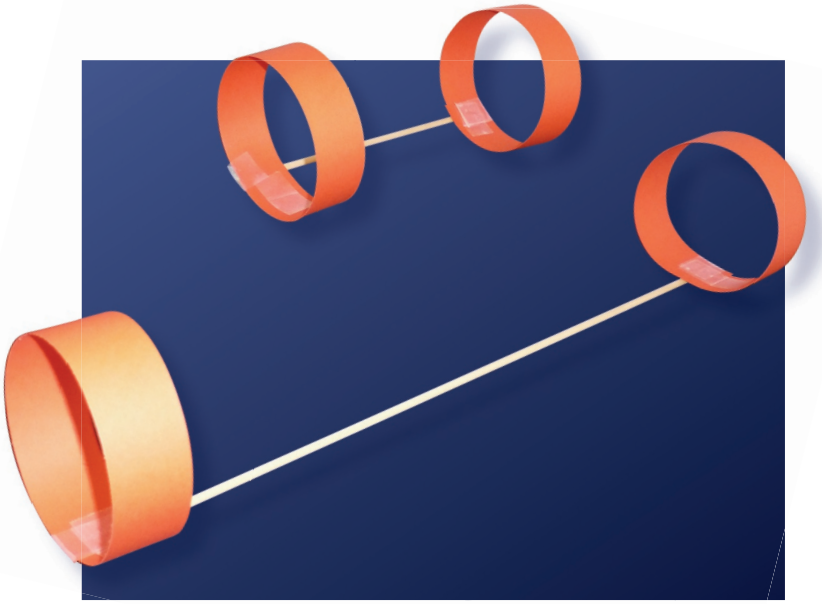

Figure 3 *- Different length of fuselage.*

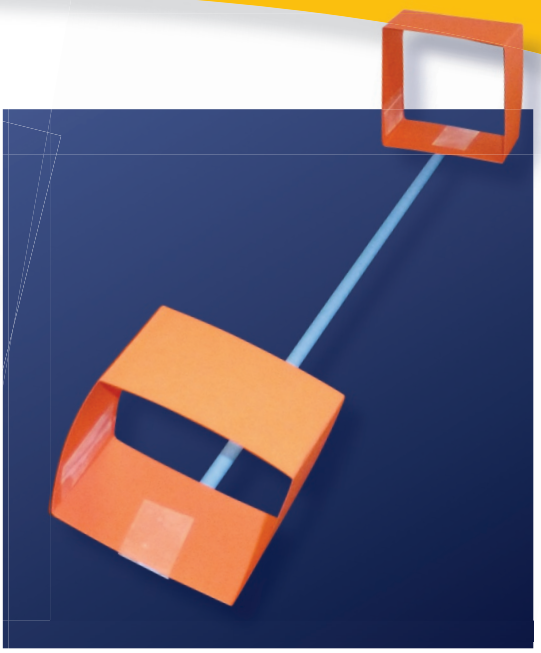

Figure 4 *- Different shaped Os.*

The activity described could help to support the following *Curriculum for Excellence* Experiences and Outcomes [3]:

By investigating forces on toys and other objects, I can predict the effect on the shape or motion of objects - *SCN 1-07a*.

By investigating how friction, including air resistance, affects motion, I can suggest ways to improve efficiency in moving objects - *SCN 2-07a*.

I have collaborated in investigations to compare magnetic, electrostatic and gravitational forces and have explored their practical applications - *SCN 2-08a*.

Through discovery and imagination, I can develop and use problem-solving strategies to construct models - *TCH 1-14a/2-14a*.

Having evaluated my work, I can adapt and improve, where appropriate, through trial and error or by using feedback - *TCH 1-14b/2-14b*.

For more information about O-wings and to see elaborate designs look at those made by Steve Spangler, the Surfing Scientist [4].

Health and safety considerations

As with any activity where learners will be throwing objects, care must be taken to ensure that the O-wings are not thrown directly at anyone.

This is even more important if dowelling is used as the fuselage since there is a greater risk of injury if it hits someone. Whilst not removing the need for close supervision of the activity, ensuring that the end of the fuselage is covered by the cardboard "O" will reduced the risk of injury. See Figure 5.

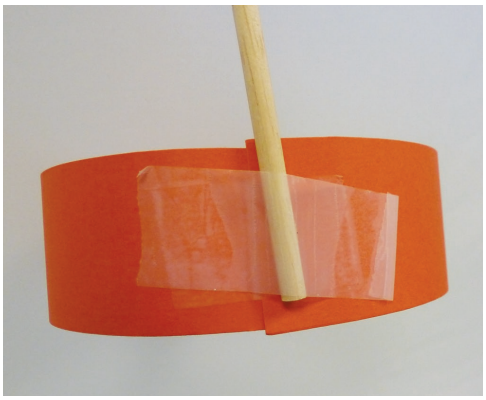

Figure 5 *- The card covering the end of the dowelling.*

References

[1] www.youtube.com/watch?v=lsjdGLwZ1a8 (accessed 18th March 2013).
[2] www.educationscotland.gov.uk/learningteachingandassessment/curriculumareas/sciences/principesandpractice/index.asp (accessed 2nd April 2013).
[3] www.educationscotland.gov.uk/thecurriculum/howisthecurriculumorganised/experiencesandoutcomes/index.asp (accessed 22nd April 2013).
[4] www.abc.net.au/science/surfingscientist/pdf/lesson_plan06.pdf (accessed 3rd April 2013).

Scotland counts

Citizen Science is a term used to describe public participation in scientific research. Across the world, volunteers gather a wide range of data vital to protecting and improving our environment.

The Conservation Volunteers introduces the Scotland Counts project, which aims to ensure that every community in Scotland has the opportunity to develop skills and confidence to understand their local environment through Citizen Science. In this article Stevie Jarron, the Citizen Science Coordinator for The Conservation Volunteers, gives us an insight into the Citizen Science programme.

"Citizen Science and Curriculum for Excellence fit well."

Priorsford Primary
Deputy Head - Wilma Burns

Our School Citizen Science pilot project, delivered in partnership with Education Scotland, has been trialling techniques which facilitate learning in schools across Scotland, increasing the capacity of learners to undertake Citizen Science projects. To achieve this, 30 schools have been selecting from a suite of Citizen Science activities to use with their pupils over the last 2 years. These activities use Citizen Science to engage learners in a new way to understand and interact with the environment, benefit from learning outdoors, value the green places in their local communities and participate in a process of data gathering contributing to scientific knowledge on a UK wide scale.

The Citizen Science activities and supporting resources have been selected to achieve outcomes across the curriculum, ensuring that a wide range of learning experiences is explored whilst maintaining attention and enthusiasm.

The additional but highly valuable benefit of the Citizen Science activities is the collection of biological or environmental records from many of the activities, which are sought by a range of local and national organisations. The data gathered is essential to inform important and potentially profound changes to our understanding, management and protection of the environment. Being able to contribute to this body of knowledge gives the learners a sense of achievement as they see their data appear on websites and understand that their 'dot on the map' shows how they have made a real difference to the environment around them.

"Pupils showed a real interest in research elements of Citizen Science. From this we organised Eco days which were very positive, parents were amazed at their knowledge from Citizen Science projects".

Kings Park Primary
Deputy Head - Joyce Noble

The pilot phase of the project is drawing to a close with refinements to the activities made from the feedback given by teachers in the pilot. We now open the Citizen Science material for use by all ages, abilities and needs in schools across Scotland.

The *Scotland Counts* webpage [1] links to a range of education materials, tools and other activities that allow everyone to take part in Citizen Science. We are keen to know about your use of these resources, so if you do so, please get in touch with us. Please contact Stevie (s.jarron@tcv.org.uk) who would like to hear about your experience of using Citizen Science. Stevie can provide you with further information and put you in touch with local and national organisations that may be able to support your Schools Citizen Science work and provide training sessions for teachers and learners.

Reference

[1] Developing Citizen Science Across Scotland - www2.tcv.org.uk/display/scotlandcounts (accessed April 15th 2013).

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