

Beat the flood...

■ Jo Cox

...Redmoor Academy and Practical Action engaging students in STEM

Why teaching STEM is so important to Redmoor Academy

Redmoor Academy is a Key Stage 3 (age 11-14) school in Leicestershire and has a student cohort of just over 500 pupils. The Academy has a long history of encouraging pupils to consider how the STEM subjects relate to each other and to their future careers, and has made great inroads into ensuring that all teachers of STEM subjects are delivering the same message. Our hope is that pupils begin to develop a passion for STEM as opposed to simply science, or mathematics or technology. As a Key Stage 3 school, we do not deliver engineering *per se* as part of the curriculum – but it features heavily in our extracurricular activities. In fact, we have just submitted four projects for the Talent2030 competition to promote girls into engineering.

I am often asked why we invest so much time in the delivery of our extracurricular programme of events (currently a total of 9 different lunchtime clubs and activities, including CREST, Talent2030, FunSTEM, Enterprise, First Lego League, to name but a few) but, to me, the answer is simple; latest figures show there is an untenable shortfall in scientists and engineers in this country, especially amongst women, and that well over 70% of all future careers will be STEM-based and for children to have no concept of what STEM subjects are is simply nonsensical. To this end, the school is developing a new STEM faculty and has adapted my role to oversee this as Senior Leader of STEM.

In a recent pupil interview, our Head of Maths was asked (rather tongue-in-cheek) which is more important: science or mathematics? Her answer summed up our ideals perfectly: 'You can't have one without the other'. That is the message

that I want all our pupils to take away to their upper schools: science in the maths classroom, maths in the science labs, technology and engineering everywhere!

Why we got involved with Practical Action

Our school has used several of the Practical Action resources in the past, simply because they are easily accessible, always written with delivery in mind and are fully engaging. Set in a global context, their popular STEM challenges are inquiry-based, problem-solving activities that give students a real sense of how STEM can be used to change people's lives around the world. They start to see how important technology is in alleviating poverty, and begin to understand why Practical Action believes in 'Technology Justice', a world in which sustainable technology is used for the benefit of all.

Another appealing thing about these resources is that they are written in such an accessible way that students can literally get started – no need for lengthy explanations, very important when you want them to be 'hands-on'.

So I did not hesitate when I was asked to collaborate on the new *Beat the Flood* challenge. Set on a fictitious island about to be hit by flooding, pupils are challenged to design and build a model of a flood-proof home...and then test it by standing it in water and blasting it with a hose pipe!

My role was to design the materials to help students look at the science of material testing in a way that would fit with the science curriculum. Students relished the chance to create the resources and, due to some truly inspirational students, the idea of tensile and absorbency testing was born. The students themselves came up with



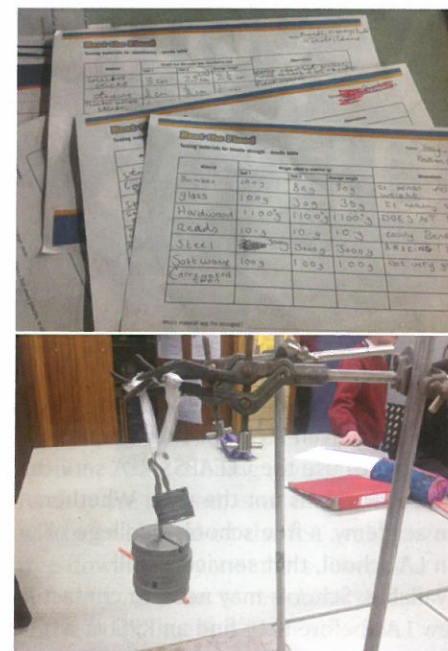
brilliant suggestions around how to test materials in a way that would help them decide what they would and would not use in their model.

'I can't believe we are actually designing experiments that other students will be using!' (Beth, Year 8)

Where do Practical Action challenges fit with the curriculum?

All the Practical Action challenges can be adapted to suit almost any subject area; they are relevant and topical and engage young minds into seeing that their skills can have an application to the world around them. Recent natural disasters have helped pupils to see the relevance of the challenge. Part of the science curriculum states that '[pupils] are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future' and this is so true of this challenge.

The testing of materials, using modelling, and research using secondary resources are all requirements of the new Key Stage 3 science curriculum and so the challenge can be embedded in lessons. As part of the challenge, students can compare different structures, an activity that fits well with the Design & Technology curriculum. So, the challenge can be delivered in lessons as well as being an effective extra-curricular activity.



We trialled the challenge as part of a collapsed-timetable day. It has been a winner in the last week of term, since pupils have seen it as a 'fun' lesson whilst actually practising important key skills. I suspect that this will feature quite heavily in National Science and Engineering Week (NSEW) too, as well as being offered as extension homework for those curriculum areas where relevance can be demonstrated.

How we used *Beat the Flood*

The global element of the challenge means that it is perfect for cross-curricular working. In fact, our geography and design departments recently used the challenge to deliver a STEM activity to the whole of our Year 7 (age 12). This coincided with the Big Bang at Redmoor Academy on 13th December. The activity was led by the Head of Geography, who was keen to link in the recent typhoon in the Philippines and develop problem-solving skills amongst our younger pupils. They were asked to widen the challenge and consider designing a house that would withstand high winds, heavy rain and tidal surges. On this particular day, pupils focused on the geographical issues, ethical considerations and design aspects. The pupils spent four hours on this challenge and were completely engaged.

'I love this project since it links my two favourite subjects, science and geography together' (Rachel, Year 8).

'I honestly thought that engineering was all about cars and planes, it's been really

interesting to see how important engineers are in developing countries' (Tom, Year 7).

How has pupils' learning been enhanced by taking part?

There are a significant number of pupils who have begun to realise that you do not have to be the most academic to succeed in these challenges – it often takes the simplest of ideas, a humanitarian consideration, an ethical insight – each pupil offering something different to the team – to have the desired outcome. We have seen pupils whom we would not normally see at an after-school club wanting to get involved – this challenge affects their world, it is real and not an academic theoretical problem that they have been asked to solve.

'Today has been amazing. I really didn't know that when you see people in the third world of the TV, they rely on scientists and engineers in other countries to help them. I thought engineering was really complicated but actually it can be really simple ideas that help others. I really want to do this when I'm older' (Tom, Year 7).

So, for me, one of the benefits of whole class and whole year groups taking part in challenges like this is that we are tapping into a wealth of potential that we perhaps would otherwise have missed. The school has a rich mix of very talented youngsters who attend STEM Clubs because they like science, enjoy mathematics or want to be computer programmers but, now, we have the future charity workers, geo-engineers, human-rights campaigners, all wanting to get involved – it is truly enlightening and I would encourage all teachers to take a risk. Don't just offer this to your STEM Clubs – see who else is out there waiting to be hooked in!

'Today has been awesome, I find science quite hard sometimes but I'm really good at design and can come up with brilliant ideas. This activity has shown me that I could be a really good engineer when I'm older' (Cameron, Year 7).

Linking to awards and competitions

Beat the Flood has been accredited for the new CREST Discovery Award from the British Science Association. One encouraging outcome of taking part in the challenge is the large number of pupils who now want to complete the



challenge to receive the Award, and we are confident that there will be an influx of pupils at CREST Club in the New Year. Following the success of *Beat the Flood*, we will be looking at Practical Action's Global CREST Challenges as inspiration for pupils who want to design their own project for the Bronze and Silver Awards. As an added incentive, there is a competition with prizes linked to the challenge, always a proverbial carrot for this age group. The competition ends on April 30th, so the timing is perfect if you carry out the challenge in NSEW.



practicalaction.org/schools

To download the resources for free, go to www.practicalaction.org/beattheflood
For a free poster contact:
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