Claire Seeley's class learn of the important role of science and technology in solving a real-world problem as they tackle a practical challenge

Figure 1 Will our model stand up to the deluge?

Using science and much more to Beat the Flood

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Always on the look out for real-life learning contexts, I was instantly attracted to the Practical Action resources when I came across them at the ASE Annual Conference in January 2013. The 'Beat the Flood' challenge pack was particularly appealing as we were already planning a topic on water for the autumn term. As time moved on this topic began to resonate with our world in profound and unexpected ways. In October 2013, our part of the UK was battered by a large storm, leaving many of our rural children without power for three days. Then, as autumn progressed into November, the media were full of the devastation caused by typhoon Haiyan in the Philippines. As the children watched images of the destructive power of intense weather systems, they asked lots of questions about how such disasters happen and about the link between flooding and climate change.

Introducing the challenge

The Beat the Flood challenge involves designing and building a model flood-proof home, which is then tested in 'flood' conditions. It is set on the fictitious Watu Island (Figure 2).

The children formed teams with each team member being assigned a responsibility for the duration of the task – team leader, chief recorder and resource manager. This strategy was useful for ensuring that everyone took an active role throughout the project.

Through discussion and research we learnt that in a flood water is not clean, because

of sewage and contaminants. Linking the images they saw on the television with our project, the children imagined what it might be like to live in a flooded area, growing concerned about the hidden dangers below the surface of the water. On the news we saw the frightening effects of the wind and powerful tides in coastal areas. The more we stopped to look, the more we realised that our flood project was about real people with complex problems.

The children began to think about where the best place for a village might be on Watu Island. They appreciated the need for a balance between access to fresh water and avoiding the flood plains.

Using science to inform our designs

The children then faced the challenge of choosing the most suitable materials for their flood-proof houses. The challenge pack includes a well-thought-through list of building materials and modelling equivalents; for example, using tin-foil trays as a substitute for sheet metal or Lego bricks instead of clay bricks. Each team tested a selection of the suggested materials for absorbency and tensile strength. The tests were well worth doing as the children really started to think about the properties of these materials in context and they were surprised by the results. Impressed by the tensile strength of wood and its cheap and sustainable credentials, for many teams it became the material of choice. This aspect of the challenge is a great fit to the new science curriculum in England at key stage 2, in particular the requirements around working scientifically and content linked to properties and changes of materials.

Designing our flood-proof homes

As we moved into the design phase of the challenge, the children discussed their design brief and the purpose of building the model (Figure 3). Taking on the role of architects gave them a huge sense of importance. We discussed at length the purpose of design, exploring the idea that it is far cheaper to work out your designs on paper and in models than by simply building a house from scratch – something they had not considered before. One issue that the children struggled with was the idea of peeling back their designs, thinking through the technical aspects of the build – the joints and structures that they would create beneath their building (Figure 4).

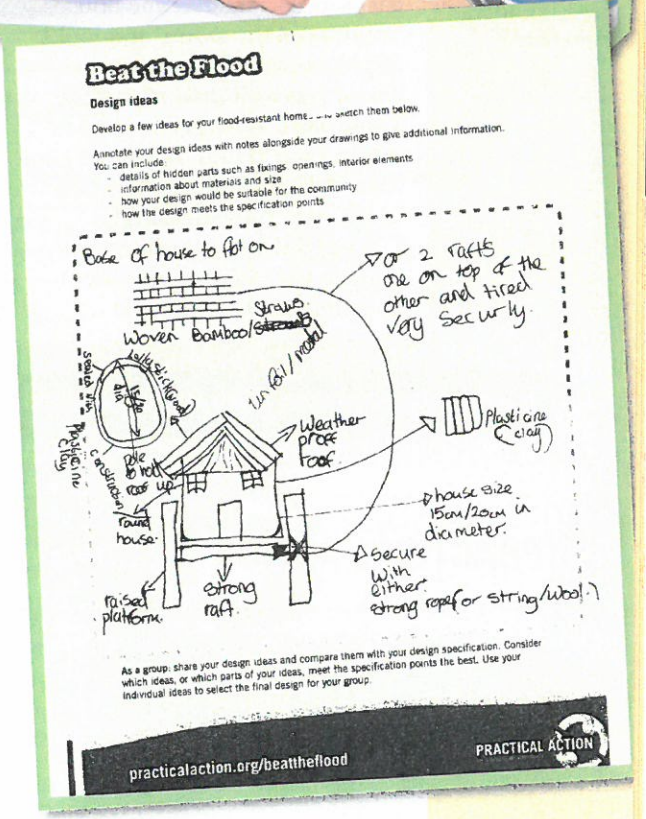

Figure 2 The plan of the fictitious Watu Island provided in the pack

Figure 3 (above right) The important design stage

Figure 4 (below right) One team's design ideas

Testing our final buildings

Once the children had built their flood-proof homes we needed to test them to see whether they would stand up to a deluge.

Figure 5 Wood was the material of choice because of price and relative tensile strength, but would it 'Beat the Flood'?

This was the moment we had all been waiting for! It was with huge excitement that the children let the heavens open on their models (Figure 5). There were gasps of delight as some houses 'weathered the storm' and looks of puzzlement as some houses coped less well than expected! There were various choruses of 'I told you so' within teams, as good ideas were vindicated and bad ideas were proven as such.

What did become abundantly clear to the children was the importance of design and forethought. They learnt that there are ways to mitigate the effects of floods and storms through careful design and testing of materials. They could see a real purpose for science and technology and why thinking things through is such a worthwhile activity.

What did we learn?

The challenge helped the children to develop an increased awareness and understanding of development issues and how science and technology play an important role in tackling global poverty. It is important to have such a global dimension in education, widening children's worldview and allowing them to see their role in wider world. This powerful project enabled the children to see that perhaps they have something worth saying about these issues. Inspired by their work, they wrote persuasive letters to government recommending that all new-build homes should be flood proof. One child wrote:

It is clear you never know when the weather will change. The climate is changing due to global warming. It is warming because of human pollution. Weather is getting more extreme. A flood-proof house would help because if there was extreme weather, this would stand it.

A bonus is that this type of activity is packed full of cross-curricular links, both to the curriculum in England and further afield. The cross-curricular nature of the way we teach today has real benefits. Over the course of this project, the children used a wealth of science enquiry skills, ranging from asking and answering their own questions, taking measurements and carrying out research, to presenting findings from enquiries and identifying causal relationships. They also made links to geography, design and technology and to literacy, both in considering the purpose of written work and in speaking and listening.

This challenge could easily be developed further, for example by bringing in links to mathematics. This could involve costing out our buildings and thinking about the price of rebuilding communities affected by flooding and why their houses were made of possibly inferior materials in the first place. The possibilities are endless. I will definitely continue to use Practical Action materials and share their inspiration with children and colleagues alike.

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Running your own Beat the Flood challenge

PRACTICAL ACTION

All the materials that you need to run your own Beat the Flood challenge are freely available to download from **http://practicalaction.org/beattheflood**.

You can submit children's work to Practical Action's competition, which has prizes of £250 for winning schools and £25 vouchers and wind-up radios for pupils. These flexible materials could be used as part of the Crest Award Scheme, as a part of National Science and Engineering week or as part of a science week; however, we found them to be equally of value in the heart of our everyday learning. We found that the children needed to do some additional research into flood-proof design to help them to understand the difference between a flood-proof home and a more conventional design. We did that as a homework challenge, which interestingly had a better response than other homework activities!

Practical Action produces other equally thought-provoking challenges for children – the Squashed Tomato Challenge, to help farmers in Nepal get their tomatoes safely to market, and the Floating Garden Challenge, which asks children to design a system that will enable farmers in Bangladesh to grow crops even during the flood.

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