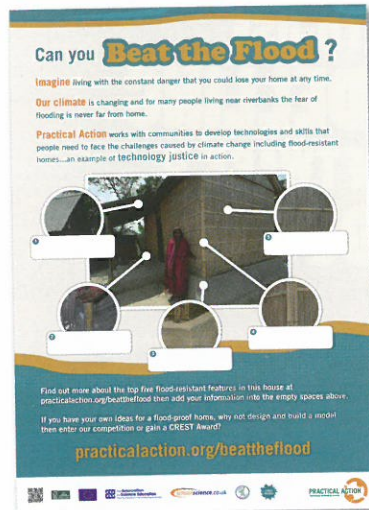


Practical Action Beat the Flood

PRACTICAL ACTION
Technology challenging poverty

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Beat the Flood is a new STEM teaching resource prepared by Practical Action. The challenge is set within the context of a community living on Watu island who are experiencing increased risk of flooding. The students use a range of STEM skills to explore existing designs used by communities to prepare for flooding, materials and structures testing and opportunities to design and develop models based on their specification to meet the needs of their community for a flood-prone home. It can be condensed into a couple of lessons or run over a 5-6 week period.

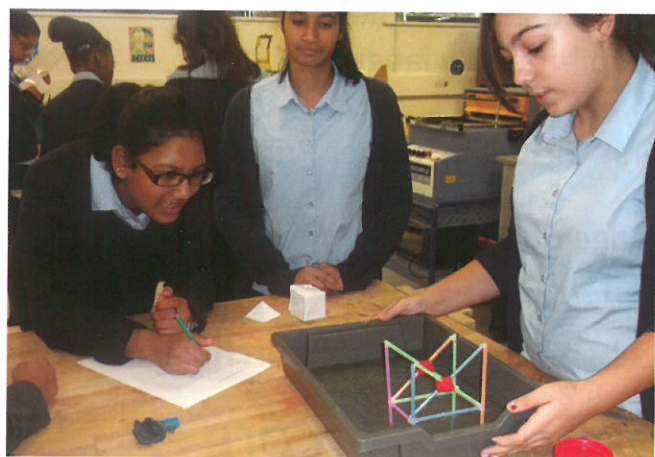
The project was timetabled to start soon after autumn half-term. During the first lesson I asked students to describe their experience of

flooding. Washing machines breaking and relatives living near rivers that had flooded meant students understood the chaos that it caused. We discussed the role of an engineer and the opportunities that exist to help others through improved design in disaster prone areas. A week later, when typhoon Haiyan hit the Philippines, students were shocked and appreciative of the disastrous consequences of a flood and our previous conversation seemed especially pertinent.

We ran the project as follows:

Week one – introduction and testing of structures

The students enjoyed the structures exercise, particularly testing in a tray of water. It led to clear results, with the frame being far more suitable to watery conditions. Students recalled designs of houses on stilts. They understood that the less surface area to come up against the pressure of water flow, meant the safer the structure would be.

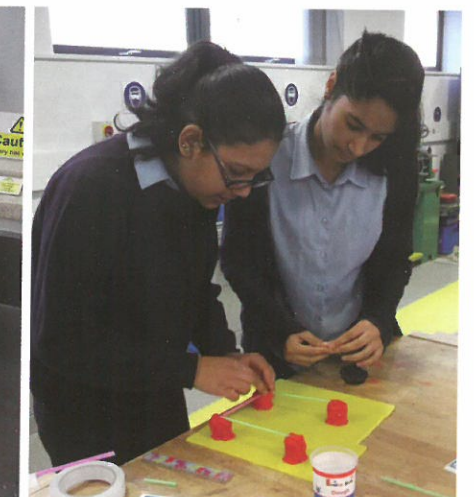


Week two – material testing

It helped to have all the material types labelled so students could compare like-for-like. We tested a range of materials that would be used in the modelling process. Students were very surprised by the strength of some materials. Being able to balance the pros and cons of the different materials was sometimes difficult. For example, plastic straws had no absorbency but very little strength, whereas lollipop sticks were very strong but were partially absorbent. The research into existing flood proof homes was set as a homework activity.

Week three – specification and designing

The students were introduced to their communities and applied their findings in the testing exercises to the design specification. Having a costing sheet and a budget really focused their thinking. The students found it hard to choose an appropriate size for a home to house six people, starting initially with a footprint of a typical home in the UK. The discussions were enthusiastic and students were very keen to start the modelling.



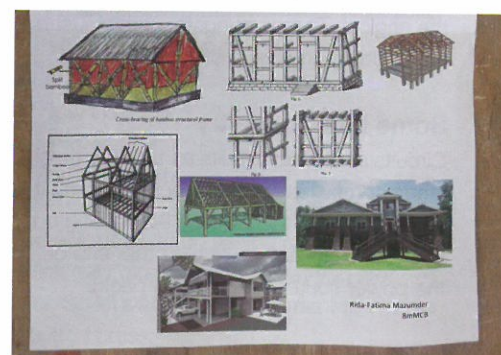
Week four – modelling and testing

Presented with the array of materials students found it hard to limit themselves to the budget and designs were being modified on the hoof. The more disciplined teams stuck to their original plan and had more success in the testing stage. Homes that were elevated above the flow of water stayed put and structures that made use of local materials (dung substituted by Play-Doh) to fix them to the ground held firm. Time went quickly and students worked under pressure to meet the deadline. They felt £500 was only just enough to build a home, they thought they would do a much better job with a budget of £800-£1000.

When I asked how they felt when comparing their own home with the homes they designed on a low budget they commented on the better quality of materials we have available to us, the use of foundations to secure the home and the quality of life with separate rooms in a home for privacy.

Week five – presentations

The group presentations were prepared as PowerPoint slides and viewed at the end of the lesson by the whole group. The presentation was an opportunity for the students to emphasise the areas of the project that they most related to. Some students broke down their material and costing choices and justified their design decisions; some emphasised the structure and design of their model and its success in the water test, whilst other students described their fictional communities, the imagined conditions and their research about floods and peoples' lives affected by flood.



All students engaged with different aspects of the project and understood the breadth of the designer's role.

Impact on students

Beat the Flood truly caught the imagination of the students. News reports compelled them to engage fully with the project and take seriously their role in their teams. It is also a very balanced STEM project with each strand equally present and necessary to the outcome.

Running the Beat the Flood Challenge

If you want to run your own challenge then the resources are free to download from practicalaction.org/beattheflood



We found that lolly sticks were the strongest (from the materials we tested) and weren't too absorbent...so a good material for us to use. They represent softwood.

(Student)

