

JAMES DYSON FOUNDATION UNDERGRADUATE BURSARY
Plastic-sand bricks
Egle Augustaityte
Girton College, Cambridge
Activity report

Activity

The activity involved collaboration with two other bursary receivers: Sam Dixon and Eoghan Butler. Since we were all working on sustainable construction materials. It was discussed between us that the 1.5-hour block should be divided into 3 parts: an introduction to sustainable construction presented by Sam, a discussion on plastic bricks, plastic waste problems and plastic sorting by me and interactive activity of making compressed earth blocks by Eoghan.

My activity followed the order described below:

1. General discussion on the problems with unsustainable construction material (specifically in Kenya).

The problem is that in Kenya some houses are built using coral bricks, which hurts the variety of coral reefs and coral fishes.

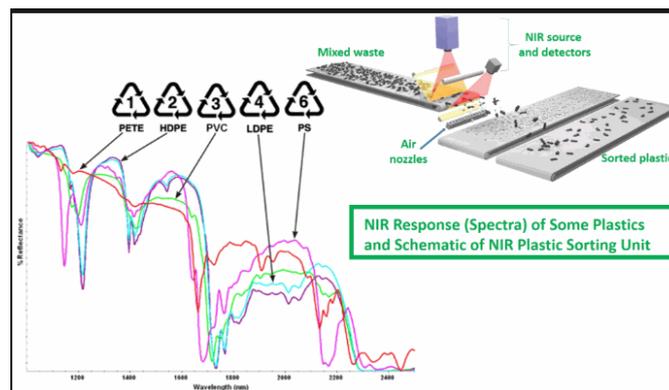
2. Discussion on the lack of proper waste management systems in Kenya (specifically in coastal regions)

This means that wash-out waste is not collected and is left on the land or ocean to degrade.

3. A video was shown to illustrate the life cycle of a water bottle, where 3 different paths are discussed: plastic in the ocean, in landfills and recycling.

The link: https://www.youtube.com/watch?v=6xINyWpPB8&ab_channel=TED-Ed

4. Explanation of the plastic sorting principle in recycling centres was illustrated using the figure below



5. After discussing plastic sorting in centres, sorting in remote areas was talked about. The following are the different ways that were presented:
 - a. Sort by looking at the logos (1 means PET, 2 – HDPE and so on)
 - b. Sort by remembering plastic types for specific products (water bottles – PET, water bottle caps – HDPE, etc)
 - c. Sort by density. The interactive activity was presented, where in a glass bowl shredded PET and HDPE plastics were added by one student from the class. As PET

plastic density is higher than water's it sank, and HDPE density is lower, therefore, it floated.

- d. Sort using a handheld scanner. The problem of these devices being at the prototype level was highlighted.
6. Then it was discussed that the combination of discussed problems: lack of sustainable construction and proper waste management can be tackled by creating sustainable construction out of plastic waste. Examples shown in the figure below were given, where:
 - a. one way used to do this is by filling PET bottles with shredded plastic waste (eco-bricks)
 - b. another solution is by melting plastic and extruding it into moulds like LEGO (e.g., Precious Plastics, Recycle Rebuild, ByFusion)
 - c. a third way bricks are made is by mixing melted plastic, used as a binder, with sand as done in The Gambia, Kenya and India (WasteAid, Gjenge Makers and Rhino, respectively)



7. In the end my project was presented.

It was discussed how plastic acts like a binder (glue) with sand. Samples were spread around the room for students to inspect. The compressive strength of these samples was compared to clay bricks and concrete.

8. Q&A session was held at the end

Outcome and review

The presentation and video seemed to be very well received by the students, based on the amounts of questions asked after the presentation.

While presenting plastic sorting, questions were asked to the class and students were answering them actively. They did not know the density of water or different plastics; however, this was highlighted on the wall. After asking which plastic will sink and which will float there was a silent moment. For this, a very well-known experiment of oil floating on the water was reminded to students and they immediately were able to differentiate between the densities of plastics and pick which one will float, and which will sink.

The 4th year project was presented quite quickly without getting too much into detail, however, most of the questions were asked about this section. This shows the engagement of the class in this topic.

Overall, I believe that the whole activity was very successful. Students were engaged in listening and participating in activities. They asked many questions that highlighted their interest in this matter.