Empowering Environmental Change Makers Through Science Education

Zaynab Karimjee

This year I discovered that my role as a teacher is to provide my students with a rich learning environment where they can harness their passion, creativity, and knowledge to make the world around them a kinder, better place. Beyond just learning material in the curriculum, I strive to empower my students with the confidence to become changemakers within their communities and value global citizenship. Integrating these values into science education was seamless, and led to innovation and discovery in my own teaching practice.

This came to fruition during a previous practicum, where I had the absolute joy of teaching a cohort of charismatic, personable and overwhelmingly lovely Grade 4/5 students. Over 70% of my students were learning English as an Additional Language (EAL), and I quickly realized that the path I initially intended to take in my teaching would not be providing them with the vibrant learning atmosphere they deserved. I threw my previous plans that were rather (and unfortunately) worksheet heavy out the window and came to the conclusion that in order to make learning meaningful for my students, it had to be hands-on, experiential and engaging.

After a substantial amount of time spent brainstorming and fondly reflecting on my own childhood memories as a student, I found myself knee deep in a blue recycling bin, clawing through piles of used paper and the occasional misplaced yogurt lid. I was scavenging and undignified, but I was doing it for the sake of my students' education, so personal pride was hardly of any importance.

For some background information on how I ended up sifting through the bins, I had decided that I wanted my students to recognize that as individuals, they could take part in actions that would lead to positive outcomes for the environment and earth. In connection to the Ontario Grade 5 Science Curriculum's unit on Properties of and Changes in Matter, I explored strand C1.2, to *"assess how the use of specific materials in the manufacture of common products affects the environment, and identify actions that society and individuals can take to mitigate negative impacts"* Upon reading this curriculum strand I knew I had found a goldmine. My students viewed paper as a disposable classroom material and would run through reams if given the chance, yet were these budding environmentalists with care and concern for the state of our planet.

We launched into a full blown study of paper manufacturing, delving into deforestation, paper mills, and all the facets involved in the production of this simple commonplace classroom material. My students were stunned and began reflecting on their own paper usage frantically. This uproar inspired the question *'What can we do to make a difference? Can we do anything at all to make it better?'*

It was music to my ears. The answer to 'Can we do anything to make it better?' is always yes- especially when working with young, impressionable children who *need* to believe that they are capable of doing something good to improve the world around them. The absence of hope leads to apathy, and that is the last thing our children need.

This brings us back to the blue recycling bin. The paper I collected from different bins across the school that would have otherwise ended up in a recycling plant were going to be repurposed. We were going to make our own paper exclusively out of recycled materials, and our manufacturing process was going to be energy efficient too. We were going to make something beautiful.

Collecting the scrap paper was easy enough, but I knew that I had neither the budget nor equipment to make individual wire frames that each of my students would require for this project once we got to the pulping stage. Thankfully, my cries of desperation were heard and rewarded by a hungry squirrel chewing through the large window screen in my living room, trying to break in and steal my food. Another goldmine. I decided that rather than making twenty four individual sheets of paper, we would make one ginormous sheet using the rather large wired window screen. For the first time, I found myself grateful to live in animal infested student housing. I grabbed my magic bullet blender used exclusively for protein shakes, and was satisfied that after much and painstaking effort, I had finally collected all of the materials I needed to bring this project to life.

Day one was pure chaos. Our task was to rip the sheets of paper into tiny, miniscule pieces. My students revelled in being *allowed* to rip up paper and joy was abundant in our classroom that day. Students were split into small groups, and each group was instructed to soak their paper shards in a bucket overnight. Day two was when the excitement truly began. My students further ripped up their now soggy bits of paper and delighted in the sensory experience. Once the paper had been torn to its limit, it then journeyed to my bullet blender to form a thick, sodden pulp. Recognizing that the pulp was a rather downtrodden shade of murky grey, I let my students add

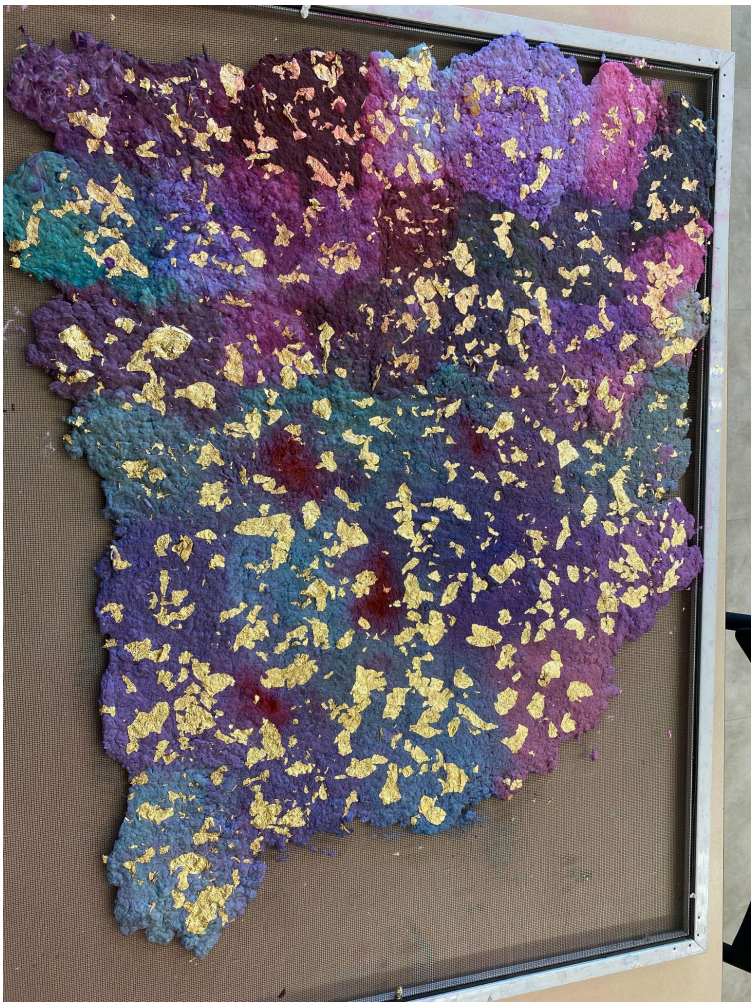
food colouring to their pulp, embodying colour and personality into their paper creations. Once their pulp was prepared and adequately coloured to the liking of my students, it became time to materialize the project.

Set up at the back table with old towels from my linen closet laid underneath the wired frame, my students took turns pouring their pulp onto the screen. We pressed it down together with sponges, soaking up the excess moisture, and slowly our enormous piece of paper began to come together. It was a mismatched assortment of blues, purples and pinks and radiant all the same. I had even dived into my own personal art stash and gave my students little flakes of gold leaf to sprinkle throughout our creation. It was beautiful, and my students were brimming with hope, innovation and imagination.

We allowed our paper to dry by an open window for about a week, and it eventually hardened and solidified into a thick, texturized sheet. I cut it into tiny rectangles, giving each student a piece to use as a bookmark. Our learning and passion for environmentalism only began there, as we then went on to create a sustainability guide for other classes who might want to embark on a paper making project similar to ourselves. We included recommendations for how to make this a low energy, eco-friendly project, and also included suggestions that classes could incorporate to reduce their paper usage. I also noticed that my students' paper consumption plummeted, and took pride in the environmental stewardship they were instilling in their daily lives.

Now when I look at my multicoloured bookmark created by my brilliant students in that Grade 4/5 class I am filled with wonder and amazement at the capacity that children have to be

innovative leaders for our future, especially within science. Their creativity and innate desire to make the world around them a better place is not something that should be ignored, it should be nurtured and celebrated. So when in a drought of ideas on how to make learning meaningful, engaging, and hands-on, I encourage all other educators to go poking through a garbage or recycling bin. While the smell may be initially off putting, the product of our collective learning from this experience proved to be worth it a hundred times over.



Safety Precautions

GENERAL SAFETY PRECAUTIONS

- Review and co-create an anchor chart of safety procedures and expectations ahead of starting this project, and make it clearly visible to students during the project.
- Ensure that the surface underneath the wire frame is lined with towels in order to absorb excess moisture from the pulp, thereby protecting surfaces and preventing spills onto the floor.
- Spills must be cleaned up immediately in order to prevent any slips or falls, and teachers should keep extra towels or a mop easily accessible so this can be done promptly.
- Have students come to the frame and blender area in small groups to avoid overcrowding, as this can result in spills and accidents.

FIRST AID

- Teachers must have an easily accessible and visible first aid kit in the classroom, and either possess first aid training themselves or know how to immediately reach someone with first aid training in the event that first aid must be administered.

CLASSROOM HYGIENE

- Teachers must make sure that all of the recycled paper they are providing their students with is of a suitable hygienic standard and is not contaminated with food waste or other contaminants

- Teachers must ensure that the completed paper creation has a well ventilated area to dry in order to prevent mold growth.
- Teachers must ensure that all students thoroughly wash their hands with soap before and after participating in this project and handling materials.
- Teachers must ensure that any dye used in this project is non-toxic and child-safe.
- Once students have added food colouring to their paper pulp, they must not use their hands to mix the dye in, as it may stain their hands. Students are to be provided with a wooden stir stick, paint brush, or nitrile gloves for this step.

PERSONAL PROTECTIVE EQUIPMENT

- Students are provided with Chemical splash goggles in order to prevent any splashing liquid from entering their eyes.
- Students are provided with aprons or be instructed to wear old clothes in order to prevent the dyed paper pulp from staining their clothing.
- Students are provided with nitrile gloves when handling the recycled paper and paper pulp to protect their hands,

SAFE STORAGE OF CHEMICALS AND EQUIPMENT

Food Colouring

- All food colouring and dyes should be stored in clearly labeled, child-proof containers
- The teacher will handle the dye and add the desired amount of drops to the paper pulp for the students.

Electrical Equipment (Blender)

- Teachers must ensure that the blender is unplugged when not in use, all cords are secure, and that it is stored in a clean, dry area that is inaccessible to students.
- Only the teacher may use the blender in order to prevent injury to students, and students must remain at a safe distance while the blender is in use.

Buckets, Towels and Sponges

- Wet towels and sponges must be air dried and wrung out in order to prevent mold and bacteria growth
- All buckets must be dried in a ventilated area before being put away in storage

Paper Pulp

- Excess solid paper pulp should be disposed of in a compost bin after the project is complete
- Excess paper pulp should not be disposed of in the sink, as this may cause blockages to the draining system.

References

Ontario Ministry of Education. (2022). *Science and technology* (Grade 5). Curriculum and resources. Retrieved October 20, 2024 from https://www.dcp.edu.gov.on.ca/en/curriculum/science-technology/grades/grade-5/c/c1

EuroKidsIndia. (n.d.). *Teaching kids to save paper*. Retrieved October 28, 2024, from https://www.eurokidsindia.com/blog/teaching-kids-to-save-paper.php

Jane Goodall Institute Canada. (n.d.). *Mission and vision*. Retrieved October 30, 2024, from https://janegoodall.ca/about/mission-and-vision/

World Wildlife Fund. (n.d.). Pulp and paper industry. Retrieved October 26, 2024, from https://www.worldwildlife.org/industries/pulp-and-paper

Science World British Columbia. (n.d.). Making paper. Retrieved October 27, 2024, from https://www.scienceworld.ca/resource/making-paper/