Transdisciplinary Knowledge Creation is Anything but Rubbish: Connecting Microbial, Middle School, University, City and Business Communities in an Effort to Remediate an Old Wyoming Landfill

By

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Abstract
Our community-based participatory action project was inspired by four middle school teachers from a small town in Riverton, Wyoming. These educators set out to develop meaningful problem-based learning for sixty 7th grade students enrolled in an interdisciplinary STEM class. In their hometown there was an old, unlined landfill that closed in 1983 and since its closure, community baseball fields were opened on the northern periphery of the site. In 2014, following a state-wide assessment of landfills, this landfill was listed as eleventh on a list of the eleven “highest priority” landfills. Data indicated elevated levels of iron, manganese, and cadmium in groundwater surrounding the landfill. The middle school teachers partnered with Rachel Watson, who directs an active learning initiative, an outreach program and teaches our capstone course for senior microbiology majors. Together with other stakeholders, the educators navigated the signing of a memorandum of understanding (MOU) between the City Officials, the engineering firm leading on-site remediation efforts, the middle school and our capstone course. Rachel, graduate researchers and our capstone group outreached to the middle school at the start of the fall term. Together alongside the 7th graders, we learned about the landfill and considered possible remediative strategies such as phytoremediation and bioremediation. In October, all sixty seventh graders traveled to the University of Wyoming where they learned about plants and worked with microorganisms. During the fall semester of 2020, university students in the microbiology capstone course performed in-depth research to characterize microbial populations in the surface and plant root soil at three sites in and near the landfill area. In November we met with the 7th grade students and engineers on-site where we all learned from the engineers and then soil samples. Our research supported the engineers’ phytoremediative approach and allowed them to suggest best locations for plant growth. The 7th grade students attended the our research posters at the end of the Fall semester and now the posters hang in the 7th grade classrooms. The 7th-grade students have formed diverse teams and they are creating a plan of action for how to tell this story to the citizens of their town and state. Along with their teachers, they will present this story to their City School Board in May and at a state-wide conference in August. In this community-based participatory action research project, we have knit together unlikely collaborative partners, from 7th grade students to distinguished city leaders to empower, liberate and connect communities. Likewise, our research is transdisciplinary, and encompasses knowledge creation through techniques ranging from microbial DNA sequencing and computer coding to storytelling. This Honors Thesis will focus less on the lab results of that research, and more on the impact of the experience. In the spirit of Participatory Action Research, we will tell our story collaboratively through self-interviews using questions that we drafted together to create a video.

Video Link
“Transdisciplinary Knowledge Creation is Anything but Rubbish”
https://www.youtube.com/watch?v=r_ovy4RM30c&t=114s