Why Composting?

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Composting is a topic of growing interest in schools throughout the country. Why composting? There are a number of reasons.
Composting provides a partial solution to an issue of great concern in many communities. All around the country, landfills are filling up, garbage incineration is becoming increasingly unpopular, and other waste disposal options are becoming ever harder to find.

Composting provides a way not only of reducing the amount of waste that needs to be disposed of but also of converting it into a product that is useful for gardening, landscaping, or house plants.

By addressing the solid waste issue, composting provides a way of instilling in children a sense of environmental stewardship. Many educational programs focus on reducing, reusing, and recycling our solid wastes. Composting fits in with this idea but takes it a step beyond.

With composting, children can do more than just sending cans or newspapers off for recycling -- they can see the entire cycle, from "yucky" food scraps or other organic wastes...

... to something that is pleasant to handle and is good for the soil. Contrary to the "out of sight, out of mind" philosophy, children who compost become aware of organic wastes as potential resources rather than just as something "gross" to be thrown away and forgotten. They learn through direct experience that they personally can make a difference and have a positive effect on the environment.

Another reason for composting in schools is that it provides a rich topic for scientific investigation and discovery. Although composting is simple (you just put organic matter in a pile and wait for it to decompose), it also involves some fascinating and as yet incompletely understood interactions between biological, chemical, and physical processes.

Composting is appealing to a wide range of ages. Worm bins are a popular form of composting with young children, who are fascinated with the worms' feeding and reproductive habits. School children feed their lunch scraps to classroom worms and use the worms for projects ranging from measurement to story writing.

Teens can use composting as a focus for scientific exploration or research projects on a wide range of topics in biology, chemistry, and physics. In outdoor compost systems, there is a complex food web at work. Some of the more familiar soil invertebrates, such as millipedes, sow bugs, snails, and slugs help to shred the organic matter into smaller sized pieces, creating greater surface area for action by microorganisms, which are in turn eaten by invertebrates such as mites and springtails. Children can observe compost organisms at work and study their life cycles or carry out food preference experiments.

The vast bulk of the decomposition work in compost is carried out by microorganisms including fungi, bacteria, and actinomycetes (organisms that resemble fungi but actually are filamentous bacteria). Microbes can be plated for study of individual species, or their populations can be charted through something as simple as daily temperature measurements.

Under optimal conditions, a compost pile will heat up to temperatures in the range of 50-65°C (120-150°F), caused by the metabolic heat of the microbes. You can see evidence of this when a steamy mist rises from your compost pile as you turn it or dig into it. Students conducting composting experiments can use daily temperature readings to compare how quickly the system heats up, how hot it gets, and how long it retains its heat. Some classes have made this into a competition, for example to see whose compost reaches the hottest temperature or stays hot the longest.

If you want your compost to heat up, then some knowledge of the process is important. The heat is produced by the metabolism of microorganisms as they decompose organic matter. Chemistry plays a role in composting because for rapid microbial growth you need to provide the right mix of nutrients, primarily carbon and nitrogen. Not all of the carbon or nitrogen present may be in a form that is readily available to microbes, and it is not well understood how the various chemical forms are used or how availability is affected by other variables such as particle size, pH, or moisture content. This is an area in which many questions remain, and research by students could provide a real contribution to the field.

Physics is also important in composting. Physical characteristics of the compost ingredients, including moisture content and particle size, affect the rate at which composting occurs. Other physical considerations include the size and shape of the system, which affect the rate of aeration and the tendency of the compost to retain or dissipate the heat that is generated.

Many topics exist for scientific discovery, such as how mixing a pile affects the shape of its temperature curve. If you turn the pile, the temperature temporarily drops, then

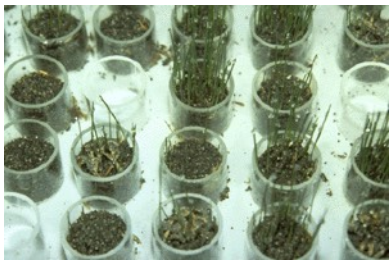
rises again. How often should a pile be turned in order to maximize the rate of decomposition? This is a topic that students could investigate.

A common assumption is that composting makes sense only out in the country or in suburban areas where people have large yards. Some of the most avid composters, however, live in the heart of inner cities, where the compost they make helps to restore or replace worn-out or contaminated soils for school or community gardens. These gardens and accompanying compost systems appear in former vacant lots, and even on roof tops and balconies of schools and community buildings.

Composting can successfully be carried out at a wide range of scales, from multi-acre commercial or municipal windrows to simple backyard heaps. It can also be carried out indoors in garbage can bioreactors or worm bins.

For research purposes, composting can even be carried out in soda bottle bioreactors, which are small and inexpensive enough to enable students to build their own individualized systems.

Once made, compost can be used for gardening projects or for plant growth experiments ranging from nutrient analysis of compost-enriched soils to use of composts to suppress plant diseases.



To sum it all up, composting is a topic that addresses a real-world issue and helps to instill a sense of environmental stewardship in youth. It can be carried out at a wide range of scales, indoors or out, in any geographic location. Because it is a process that relies on biology, chemistry, and physics, it can be used for a wide range of scientific projects or experiments and can help students to see the interconnections between various scientific fields.

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