

Solving Solid Waste Disposal Issues Through Innovation and Education

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Introduction

Garbage, recycling, and compost are three main options of solid waste disposal. The garbage is for items that are non-reusable, compost is for organic materials and recycling is for anything plastic or paper that can be re-used. The impact that each of these methods have on the environment are quite different. For garbage, all this waste ends up in landfills and is non-degradable, which is detrimental to the health of our environment. Compostable waste is organic material, therefore once these items are disposed, they can break down and be absorbed by the earth, which has less of a negative impact on the environment. Recyclable waste is sent to facilities where they can be processed and re-distributed to be re-used for manufacturing. This means that when you recycle, no waste is being left in the environment and less plastic/paper must be produced.

It's clear that, to reap the benefits of each individual waste system, a solution must be found that properly sorts out what belongs in which category so that we, as a waste producing society, can have a less negative impact on the environment. First, one of the main issues of a lack of proper disposal is identified. Second, the effects that waste disposal has on the environment will be explored. Finally, putting the two ideas together, we will propose an innovative solution to be applied in a place with lots of waste disposal: schools.

Do people know how to recycle?

Currently, as a society, we not only need a system to make sure that the right waste goes to the right place, but we also lack the knowledge of what belongs where. As demonstrated in [1], adults see the benefits associated with recycling, however when asked “which of the following prevent you from recycling?” in a survey, many adults answered with “I’m not sure what is recyclable and what’s not”. If adults do not know this, then it is safe to believe that teenagers, the main population of schools, do not also possess the right knowledge. Furthermore, due to a lack of proper waste disposal, non-organic materials, like plastics, are found everywhere in the environment and will remain as litter there until (after a long time) they degrade their chemicals into the environment [2]. These facts together prove that recycling is not properly done and one of the reasons for this is that people simply do not know where to properly dispose of their waste.

The Impacts of Solid Waste Disposal on the Environment

According to [3], over 29 million tonnes of plastic ended up in landfills in the United States in 2008. A lot of this plastic, had it been correctly disposed of, could have been recycled, re-used and, in turn, have had a less negative impact on the environment (ie. Added less plastic/garbage to landfills.) Additionally, “Over 260 species, including invertebrates, turtles, fish, seabirds and mammals, have been reported to ingest or become entangled in plastic debris, resulting in impaired movement and feeding, reduced reproductive output, lacerations, ulcers and death.” [4]. A study [5] suggested that the closer humans live to landfills, the more susceptible they are to diseases. These are just a few examples of how the way in which we, as a society,

dispose of our waste has a direct impact on the health of our planet. When not done properly, or at all, the consequences can be detrimental.

A Solution to Solid Waste Management

The knowledge and the actions of correctly disposing of solid waste, whether it be plastics, organic material, or garbage, can have a positive impact on the environment and thus the planet. One way in which we can improve this so that it happens more often, is to design a solid waste disposal management system that can determine exactly where the waste belongs (compost, landfill, recycling), send it to that destination and, in the process, educate the disposer on where this item belongs.

One way that we can create this proposed solution is using artificial intelligence (AI). Results from [6] found that the deep-learning technology in AI could accurately determine, from regular smartphone photos, whether there was food in the image. Another study, [7], concluded that AI, though it cannot yet determine the ingredients of a food, can classify what that food is overall. Knowing this, we can design a system that takes in the waste, takes a photo of it, uses AI to classify it (as recycling, compost or garbage) and then send it to the right destination.

Another way in which we can battle the negative consequences of improper waste disposal habits can be through teaching the population proper disposal techniques. Using the same AI design, when it determines what category that the waste belongs in, some learning features can be added. For this part, we keep in mind that using a multisensory learning

technique can allow people to learn better [8]. So, for this design, a multisensory approach can be the use of words on a screen as well as a voice. If the solid waste is deemed as compostable, the words “COMPOST” can show up on the screen and an automated voice can say it at the same time. This will ensure that the person who threw this waste will gain a better understanding of where it belongs, so that the next time they dispose of it without the AI sorting system, they can dispose of it properly.

Conclusion

It is evident that, as a society there is a lot of things that we can do to better the environment. Amongst those is the need for a more effective solid waste management and disposal system. Most adults aren't sure of when to place items in the recycling and compost, and many more things end up in the landfill because of this. The environment suffers negative impacts from having excess garbage in landfills and would greatly benefit from better recycling and composting initiatives. An innovative proposal to this solution would be the integration of AI for waste systems used for categorization and proper disposal, as well as education. Though this is promising, future research and advancement is needed to create this categorization data set in AI as well as how to implement it.

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