



Using Engineering Design Process to Help Plastic Waste

By Jada Ly

Define the Problem

Define the problem. You can't solve the problem without knowing what it is! For example, "We need to find a way to eliminate plastic waste in the ocean because animals are ingesting the harmful plastic and are dying." Another example of a problem is, "We need to find a way to eliminate plastic from beauty products because the chemicals can be harmful." Defining the problem is important because it helps you focus on one specific topic. This is because defining the problem makes it very clear what you are going to research and try to do. If you don't do this, then your topic might end up being "Eliminating Plastic" which is very vague and not clear. This is why defining the problem is the first and a very important step in solving a problem.

Identify Constraints

Identifying the constraints are also important because you need to plan out what and when you are doing everything so you stay organized and stay on task. You also need to plan how much money will be spent so you know how much and if you have enough. Another thing you'll need to plan is all the materials you'll need for a project. For example, if you have a project on a way to reuse a plastic bottle, then you need to know what materials you'll need. (Bottle, scissors, paint, markers, etc.) Then you need to calculate the amount of money needed for all the materials. After that, you need to know when you are doing everything. For example, Monday: Research, Tuesday: Research, Wednesday: Start Making Planter, etc. This'll keep you organized and on task since you know what needs to be done that day. If you don't do this, you may end up doing too little everyday and have to end up doing everything last minute. This is why it's important to identify constraints.

Brainstorm Solutions

Next, you need to brainstorm multiple solutions to the problem. For example, if the problem is that we need to find a way to reuse plastic bottles, then you need to find many solutions to it. (Creating planter, bottle cap art, making structures, etc.) After doing this, you can choose the solution you feel will be the best with solving the problem, the one that's most productive, the one that you like the best, etc. This is good because if you only choose one, you might be missing out on another idea that you would like more, or was more of a solution to the problem. That is why brainstorming multiple solutions is very important,

Select the Most Promising Solution

Next, pick the best solution. You should've come up with multiple solutions from the last step, so now you have to choose one. Pick the one that you like, that you feel is interesting, and that you feel will solve the problem productively. This is important because you want to be interested in your topic. If you aren't, then the presentation isn't going to be good because you're gonna be bored with your topic and not research it well. But it's still important to pick a topic that will productively solve the problem. For example, if you're trying to reuse a water bottle, you must pick a solution that saves lots of plastic, is actually useful, and that you'll have fun making.

Prototype Your Solution

Next is to prototype your solution. It's basically like building a simpler model of the actual thing which still works the same way. For example, my brother had a project about stopping exhaust from cars. They chose to use algae to stop it, and to prototype their solution, they used a toilet paper roll to represent the exhaust pipe because it's a lot simpler, and it still works to represent what an exhaust pipe does. So your prototype must be simpler than the actual thing, but still functions the same way. This step is really important to see if your solution even actually works. For example, my brother had to see if the algae really does stop the exhaust.

Test Your Prototype

Next, you must test your prototype to see if it even works at all. For example, test if the algae actually does stop the exhaust from escaping the pipe. You can do this by either putting some gas into the toilet paper roll or lighting a match for the smoke, and if the algae absorbs it without letting it escape the other side of the toilet paper roll, then it works! But if it does manage to escape to the other side, that means algae does not absorb the exhaust, therefore algae is NOT a solution in absorbing/stopping waste. This is why it's very important to test your prototype, because it may end up not working.

Iterate to Improve Your Prototype

Whether or not your prototype worked, you still should iterate and try to improve your prototype. Maybe if the algae didn't work, then maybe use more algae, put it in different positions, put it closer to other end, etc. Just experiment with it and test it. Just try to improve it and hopefully make it work. Play around with the positions of everything and hope it works out. Hopefully you won't have to really improve much with this project since you're just making a way to reuse a plastic bottle.

Communicate Your Solution

The last step is to communicate your solution. Spread awareness about the problem the world needs to solve. Let people know about your solution, and hopefully they'll be motivated to do something similar that also solves the problem, or a different problem. If everyone did at least one thing to reuse a plastic bottle everyday, then this problem wouldn't be escalating as quickly as it is. I'm trying to spread awareness about this problem that needs to be solved.