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## Student Reflection Example

When choosing the design for our trebuchet, my group and I decided on a very simple model that we were confident we could complete within the amount of time we were given to finish the project. We also originally thought that wood would be the best material to build our trebuchet out of; wood was sturdy, so it probably wouldn't collapse when we were testing the trebuchet launch, and it just seemed like it would be easier to cut and put together than to handle the PVC pipe. While we were planning out the measurements of the pieces of wood for our order sheet, however, we ran into an issue: the wood could not be taken apart and put together as easily as the PVC pipe could. If we wanted to create a bigger trebuchet, we would have to cut the longer pieces of wood into smaller pieces, and then attach and detach them using brackets and braces because the longer pieces of wood would not be able to fit inside of the box by themselves, meaning we would have to change all of our measurements to make our trebuchet a lot smaller than we had originally planned it to be. It ended up being only 18 inches tall, so that all of the pieces could fit into the box if we laid them diagonally without having to cut any pieces and use c-channels to connect them. Somehow, we forgot that since our trebuchet was small, we didn't need the c-channels anymore, and ended up spending a good amount of time in the makerspace measuring and cutting c-channels that we ended up not needing after all. However, through creating the c-channels we learn how to better use a hand saw.

Building the actual trebuchet in the MakerSpace was really fun, and it was coming along just as we had it planned in the design. We put different colored pieces of tape on the wood to make it easier to put together by color coding the wood pieces based on which pieces made up each component of the trebuchet. The only thing we forgot to do was mark which pieces matched specifically to what side of the trebuchet, because when we went back to the MakerSpace to reassemble the trebuchet, we had a hard time of figuring out which pieces of wood fit with which set of holes, since some of the holes we drilled were crooked and uneven, and we even ended up having to drill new holes. Once we set up the trebuchet, we marked the sides of the wood and the sides of the trebuchet's frame with different shapes, so that the next time we had to take it apart and then put it back together, we wouldn't have to deal with trying to fit every single piece to every side to see which one actually belonged there.

If I were to do this same project again, I would definitely use PVC pipe to construct the trebuchet instead of wood, as using PVC comes with less complications in attaching the pieces together than there

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are when using wood. I would also try to find a solution to the problem we had where the pieces wouldn't fit together correctly by drilling all the holes so that every piece fit with each other, because spending an hour and a half trying to figure that situation out killed work time that we could have spent working on the beam and pivot of the trebuchet, and we would have most likely had our trebuchet finished had we not had that huge obstacle.

Through this project I have learned to be more thoughtful when planning for materials in all aspects of the product, not just in its sturdiness or what we assume will be easier to build with. It's necessary to plan ahead and research in order to choose which material would work best for that specific project. Another skill I developed during this project is time management and how important it is to not leave things until the very last minute, because that causes a lot of unneeded stress that I wouldn't have had to deal with if I had put in more work earlier. Learning to manage my time also was helpful when trying to balance work time for this project with all of the work in my other classes, as well as my volleyball club practices that sometimes interfered with the time that I was originally planning to spend working on this project. I learned more about the importance of communicating well with team members to get tasks completed on time. Sometimes, miscommunication caused us to be confused about the times that we were all supposed to meet in the morning or in the afternoon. By communicating with each other, we divided up the workloads between the three of us so that none of us would feel overly stressed.

Another useful skill I developed during this project was learning the basics of how to use Google SketchUp. At first, it was really challenging because I was having trouble using the different tools on the program, and it was my first time trying to transfer a design sketch from paper to a computer. I think that knowing the fundamental skills for this program will help me in high school in future projects, even if I am not taking the engineering pathway.

Overall, I think that even though this project didn't end up working out due to weak communication and planning regarding our materials, our team learned a lot from our mistakes and if we were to do this project again it would be a lot less stressful and we would be able to construct our trebuchet much more quickly and efficiently. Even though we didn't get to complete our actual trebuchet structure, we all still learned important lessons and skills that we will be able to put into practice in other classes and future projects, looked for ways to problem-solve if we came across an issue, and improved our knowledge of engineering.