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CET 720 - Innovation Project

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My innovation project idea originated from teaching a Project Lead The Way curriculum called Computer Science for Innovators & Makers. I have been teaching this class for the previous three years and I thoroughly enjoy the class. I teach students the basics of block based coding through a platform called Microsoft Makecode. Students receive a Micro bit, which is a small microcontroller that is able to be programmed to do various things. The class is basically to teach students how to do physical computing in the real world. The course does a pretty good job of teaching students to be critical thinkers and problem solvers. There is only one major problem I don't like about the class. It is a project based learning class with two major (capstone) projects. After we learn about inputs and outputs on the micro bit, students are to create a security device to keep an object safe. My issue with the project is that it is too narrow and gives students a set way of how they want the project to be designed, how it should look, and what it should do. In my opinion, this kills students creativity and allows them no options to think outside the box and create something different from the strict guidelines provided by PLTW. In the following paragraphs I will explain how I implemented the eight characteristics provided in *The Innovator's Mindset* (page 48) to my project.

#1 Empathetic

Empathetic teachers think about the classroom environment and learning opportunities from the point of view of the student, not the teacher. A couple ways I was empathetic towards my students for this project was providing them opportunities to work in different environments. Typically with hands-on, project based learning

classrooms, you can imagine that it gets pretty chaotic and it gets to be a noisy environment. Some students prefer working in a quieter, more controlled environment so thanks to our librarian, I can offer this option to some of my groups. I will typically call down to see how they are doing or if more groups want to go down, I will rotate groups down there periodically. Another empathetic opportunity I give my students is the option of who they work with on the bigger/longer projects. For some smaller projects, I will have random groups or just work with your table partners. But, I have found for lengthy projects, that students find it more enjoyable to work with a friend or peer. They seem to be more apt to open up with ideas or creations for their projects, especially for the more shy and reserved students.

#2 Problem Finders/Solvers

The whole base or groundwork of the PLTW curriculum is to create students that are problem solvers. In my innovation project, I incorporated the problem finders portion of this characteristic. I encouraged students to go out and find a real life problem that they might encounter, that a Micro bit could help them solve. By doing this, I had students use critical thinking skills that they might not have tapped into if we had done the project the way it was initially set up.

#3 Risk Takers

One amazing thing I love about teaching computer science is the way it teaches trial and error. So many aspects or programming is taking a big problem, breaking it down into smaller problems and attacking them one at a time. I utilize a lot of input and output devices that can attach to microbits such as: pressure sensors, photocell resistors (light detectors), flex sensors, LED Lights, buzzers, & Servo Motors. Many of

these attachments require trial and error to either find their base numbers and program the project based on those numbers, or they require you take take risks in your build because you don't know if it will connect right, stay secure, fit properly, etc. until you actually take the risk and build it to find out.

#4 Networked

During this project, I often encouraged students that if they solved a problem, there might be another group trying to solve the same problem, so don't be afraid to share. I also encourage students to walk around and observe other students' projects, because it could inspire them or give them ideas they could potentially implement in their own project. Another example of networking in my innovation project, after students complete their project, I have them make a quick flipgrid video to explain what their project is, how they came up with that idea, and then I have them present it to the camera during their video, to show us how it works. I will then post the grid on my homework website so that parents can see students work.

#5 Observant

One thing I really try to do when facilitating, not this project, but any project in my class, is to observe students while they are building/coding. One reason is because it's just so fun to listen to students work together to try to solve a common problem, another reason is because if I am observant of what they are doing, I can offer my feedback or personal ideas/opinions to help them. If I were to sit back at my desk and just let the students work, it would not be near as effective.

#6 Creators

One of the awesome benefits of doing physical computing projects is that students walk away with real life artifacts. They can stand back after they are done and marvel at the creation they and their partners just made. There is power in taking pride knowing that you created something from nothing.

#7 Resilient

I can't tell you how many times I have had groups of students come up with a solid blueprint or idea of how they want something to look and behave. Then, when they come to create it, they can't get it to turn out the way they want it to or it's not working properly. It can be devastating and demoralizing to the group, but it leads to crossroad. Do I want to give in, give up and take the easy way out OR do I want to find out why this isn't working the way I want it to and figure out how to fix it. There is power in that moment, you can encourage students that they can do it and they can fix it and they will feel more accomplished than if they would have taken the easy way out.

#8 Reflective

One of the last artifacts I require my students to complete after the project is done, is a reflective Google Form. It asks the students basic questions, “What worked, what went well, what would I have done differently, What did not work.” Curious writes that by “Questioning our efforts, progress, and processes is crucial to innovation. By constantly revisiting our learning in any space, we find areas that can be tweaked, modified, reiterated, or even reinvented. Looking back is crucial to moving forward. Reflection also helps us, as educators, to make our own connections, and again, deepen our learning.”

Couros, George. The Innovator’s Mindset: (pp. 70-71).