Relation to the Jankowski Lab at BSU

Computational modeling is used in Dr. Jankowski's lab to accelerate the identification of suitable organic photovoltaics (OPV), an emerging technology in solar panel development. Structural and electronic properties can be predicted using computer models of more candidate OPV materials than can be tested with wet lab experiments. From these predictions researchers can identify the best OPV candidates more inexpensively than without modeling. Learning how to assemble and organize these computer simulations was the joint objective of Dr. Jankowski's RET and REU students in 2021.

There are four main alignments between this lesson and Dr. Jankowski's lab in BSU's Material Science Department:

1) Building physical models to address scientific inquiries has always been a core cognitive skill to develop in middle school STEAM education. However, 21st century K-12 education has shifted to greater emphasis on *computer* modeling and simulations. In this lesson plan, I am incorporating both physical and computer modeling to utilize the logistical and financial benefits of applying both to emerging technologies.
2) The plastic polymers researched in the Jankowski lab must have properties appropriate for large scale for roll-to-roll manufacturing. At Tri-North Middle School, we will be encouraging students to take full advantage of our new MakerSpace (3D printers, laser printers, vinyl cutters) for their tiny house structural design. This will allow students to discover the advantages and limitations of different plastic materials available in digital fabrication.
3) Dr. Jankowski's lab utilizes Python code, we will be using age-appropriate block coding to introduce concepts of functions and loops.
4) Students will be using the Micro:bit micro-computer as a proxy for solar panels. While a similar tiny home project could be executed with the use of actual mini solar panels, the Micro:bit provides light data that is automatically compiled in a .csv. The alternative of using mini solar panels (soldering, multimeter use, P = IV, etc.) requires an entire separate introduction into electricity. Therefore, just as computer simulations are used in the Jankowski lab for frontloading questions of efficient configuration, Micro:bit and MakeCode programming can allow students to model designs that maximize solar potential without needing to introduce other variables of electricity.