

Art Integration

For my arts integration lesson plan, I will be incorporating a 3D modeling and printing component. The goal of the lesson is to design an effective filter using different sized particles of sand, silt, and clay. A 3D printed component was chosen since it provides an opportunity for students to test their design digitally in Tinker CAD and physically using PLA printed materials. In addition, using 3D printed filters allows students to revise their design over multiple iterations to create a deep understanding of the impact of permeability and porosity on the filtration ability of different particles.

Using 3D printing will enhance the concept of permeability and porosity. Programs such as Tinker CAD allow students to design and revise products over multiple iterations. This provides students with the opportunity to think about how the specific size of a particle has an impact on water filtration prior to experimentation. 3D printing also allows students to make invisible concepts more visible. When using traditional materials such as clay, the grain sizes can be too small for students to see the pores between the grains. However, using a 3D modeling software can allow students to zoom in and visually determine the differences in grain sizes between sand, silt, and clay. For engineering challenges, incorporating 3D printing can be an effective way to incorporate the arts with science.

Personally, I like to incorporate the arts and especially 3D printing into as many of my lessons as possible. 3D modeling allows my students to have a low-stake opportunity to alter elements in a design and apply the principles of engineering without using physical materials and consumables. Once students have a finalized design, students can then use inexpensive materials such as PLA or TPU filament to quickly print their designs using the school's Bambu 3D printer. In addition, I find that I can print student's designs in a short period of time or while I am teaching, which provides more time for other learning opportunities. Lastly, I find 3D printing to be an effective way to engage students in the classroom since students have a physical product at the end of the lesson. However, my biggest concern is how to grade students on the final product, especially balancing the creativity component with the goal of the final outcome. As an art form, I think 3D printing and modeling is a great connection between engineering, art, and science.

In general, 3D modeling and printing can be incorporated into science courses as a way to connect science and the arts. The principles of engineering and design are directly aligned with the National Core Arts Standards. For 3D modeling, students have to artistically represent all parts in simplistic geometric shapes. Additionally, students have to revise and reiterate on their models multiple times, which incorporates elements from both arts and engineering. Lastly, 3D printing and modeling can be integrated into other subjects such as English, and math. To incorporate literacy and English students can describe the process of creating a 3D model in an essay format. For math, students must use scale and

dimensions to properly 3D model and print objects. Combining NYSLYSS principles from other disciplines can make 3D printing and all arts forms an effective tool for interdisciplinary science learning.

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