

Design Technology Infused In STEM

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It is an exciting time to be a student at Dakota High School's Design Technology program in Macomb, Michigan. This is where STEM has been a keystone of our program throughout the past 20 years. Before STEM was cool, Dakota's Design Tech program was secretly infusing all of the components of the buzz word "stem" as students were using the state-of-the-art industry standard in CAD systems and fabrication techniques applying the principles of STEM. Today they take that to an entirely new level using industry concurrent 3D design software, animation and virtual modeling systems and techniques. From there students take their drawing concepts virtually, analyze and evaluate them, prove them and finally fabricate them in a new state-of-the-art fabrication facility. This all materializes using the latest in Co2 Laser Technology, 3D Printing (rapid prototyping - FDM), CNC Machining and Plasma Cutting; all while maintaining a high level of academic knowledge. Students use all of STEM in our program but we take it to the extreme, especially focused on the "E" or Engineering. This hands-on approach to instruction has given our students that extra boost and advantage over their peers when applying for college or directly to the workforce. We truly believe "Project based learning where design meets innovation" is the key to successful student outcomes in engineering education. "If you don't apply it, they won't buy it" has been a resounding element to our success. The common underlying question from students is: "Where and when will I ever use this", our infused STEM project based program confirms for them exactly when, where, how and why.

STEM as defined in the Design Technology program breaks down into concealed education, we distract them with fun and exciting technical problem solving challenges where students don't even realize that they are applying Science or Math. While designing a part for a larger project for example, physics must be considered for the parts function, durability and strength in addition to its material properties afforded by nature or metallurgy. Math sneaks in as the part must fit within the assembly which then engages a myriad of mathematical entanglements including size, tolerance, geometry, planar geometry, datum zero reference, and more. Equations evolve as to determine scales, centrality and load bearing based on the parts intended function. The direct correlation of science and math is limitless as they are the cornerstones inherent to engineering, which is our driving premise.

Our data clearly indicates there was a positive shift in students' sense of self-efficacy in math and science because engineering was part of their curriculum.

The intent of our programs is to stimulate students' curiosity while engaging them in STEM infused activities that give them an opportunity to have fun and exciting experiences. It is also anticipated that the experiences would encourage their belief in the importance and relevance of STEM subjects to their lives, as well as to increase their sense of self-efficacy and reduce anxiety related to their own perceived ability to apply STEM skills.

STEM is a natural occurrence in our program as students use their academic knowledge base to calculate equations, write professional portfolios and develop research reports based on real-world problems. After the final outcome is measured our students present their findings to professionals in the industry.

Over the years our students have used their technical problem solving skills in researching, designing, fabricating and analyzing hundreds of past projects including full size custom electric vehicles, pneumatic fighting robots, electrified mini monster trucks, air-powered challenges and motorcycle powered high mileage vehicles just to name a few.

To see more of these project up close and in detail please visit our website at www.dakotadesigntech.com or visit us on Facebook <https://www.facebook.com/pages/Dakota-High-School-Design-Technology-Dept/934687399905553>