



How Science, Technology, Engineering and Math (S.T.E.M.) applies to skilled trades and to the technician profession, in particular.

As you may know, STEM is the acronym for Science, Technology, Engineering and Math. The popularity, as well as the availability, of STEM subjects in school has increased dramatically in recent years. STEM education often starts as early as kindergarten, progressing through elementary, middle and high school, and ultimately into postsecondary vocational and technical education programs. STEM supports academic, vocational and technical skills. It accomplishes this through integrating core academic subjects into vocational and technical education programs, with a focus on real-world applications. It moves the STEM subjects from the theoretical to the practical. The U.S. Department of Education (DOE) is a strong supporter of STEM education, and has invested in a wide number of projects across the educational spectrum.

Let's take a closer look at the STEM subjects and how they relate to vehicles, the transportation industry and the technician profession, in particular.

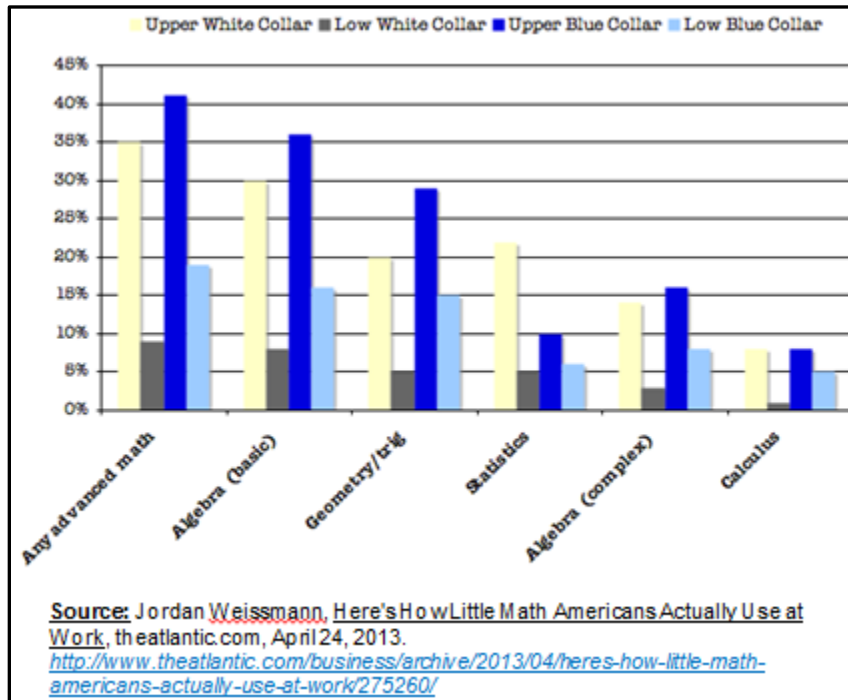
Science. To understand the modern automobile or heavy-duty truck with all of its integrated systems, one must have in-depth knowledge of electricity and electronics. They play an integral part in almost every current vehicle system. Likewise, the principles of hydraulics apply to the power train, steering and ride-control systems. Thermodynamics come into play with the engine combustion process, emission controls and climate control systems. These are all core science subjects taken from classroom theory to real world applications, employed in millions of vehicles in this vast industry of mobility and transportation.

Technology. Today's vehicles are computers on wheels. In fact, believe it or not, they have more computers, control modules and lines of code than did Apollo 11 which first took man to the Moon! No longer is the wrench the most used tool of a professional technician--- it's a computer. Technicians are now referred to as "technologists" because of the training required to stay abreast of all the new technology, which is constantly changing and evolving every day. From hybrids to alternative fuel vehicles; from fully electric vehicles to the autonomous vehicles that are just around the corner, it takes technological acumen to thrive in this profession.

Engineering. Vehicles rolling off assembly lines around the world are truly engineering marvels. It is hard to find a better example of applied engineering than today's modern vehicles. It all starts with the engineering design process, a discipline in itself. Then mechanical engineering comes into play as components and systems are developed. Electrical engineering is a massive component, as an array of different electrical networks must interact and communicate with each other. Aerodynamic engineering even plays a part as various body designs are tested in wind tunnels to ensure a combination of the lowest possible air drag to maximize fuel economy. In the workshop, the best diagnostic technicians take the time to understand the intent of the engineers and how each vehicle system was designed to work. When you truly understand how a system or component is meant to function, you have a huge advantage in troubleshooting it.

Math. Math is commonly used in everyday applications in many fields, ranging from construction to finance. You might be surprised to learn that skilled blue collar workers actually use more math in their

roles than white collar workers. When it comes to the transportation industry, technicians use electrical math daily with Ohms Law in calculating system voltage, current and resistance. They also use math to measure and calculate tolerances when disassembling and assembling mechanical components. And for those technicians that may opt to open their own shop one day, they will surely need math skills to develop their business plan, and manage their finances and bottom line!



The need for more STEM education will only increase in the future when considering a recent Department Of Education study which concluded there will be a 14% increase in the number of STEM-related jobs by 2020.¹

While many skilled trades employ real-world applications of STEM, as you can see, transportation technicians are among the roles most likely to apply STEM on a daily basis. Today's vehicles are rolling examples of some of the most complex technology on the planet. Whether it is math, science, technology or engineering, the applications of these subjects are wide-ranging in the transportation technician workplace.

Source: Science, Technology, Engineering and Math: Education for Global Leadership
<https://www.ed.gov/stem>