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STEM Education as a Vital Preventive Response to a Pandemic

By Katherine Baker, Emily Faulconer, Oliver Grundmann, Sarah Haines, Tyra Hall-Pogar, Lisa Kenyon, Susan Meabh Kelly, Peter Lindeman, Brian Schmaefsky, Candace Timpfe, and David Wojnowski

The extraordinary work to develop feasible vaccines, effective medical treatments, and accurate epidemiological studies to alleviate the SARS-CoV2 pandemic would not have been possible without collaboration between academia, industry, government laboratories, and regulatory agencies that speak the common language researchers around the world know—science! SARS-CoV2 is the virus that causes coronavirus disease 2019 (COVID-19). Yet our society at large is more divided than ever over scientific facts, foundational science knowledge, and the acceptance of scientific applications in everyday life. The COVID-19 pandemic has amplified a discrepancy that has alarmed many in STEM education for years: a lack of current and future scientists, of diversity, of broad representation, of communication of complex scientific topics with the public, of critical-thinking skills, and of readily accessible (sometimes referred to as open) educational resources to the public and educators. As an essential step toward closing these gaps, an emphasis on STEM education in higher education on all levels from general studies for non-STEM majors to dedicated STEM degrees should be implemented. Undergraduate students enrolled in STEM courses presented with better critical-thinking skills

when compared to peers who did not take such courses (Dou & Gibbs, 2013; Kennedy & Odell, 2014). STEM undergraduate courses furthermore play a critical role in increasing diversity, retention, and recruitment for graduate STEM programs (Atkinson & Mayo, 2010; Bargagliotti et al., 2018).

A continued shortage of graduates in STEM fields and STEM-related areas combined with marginal increases to public institutions of higher education for research and development funding to support such majors in recent years paints a dire picture for the future of the U.S. workforce (Li, 2020). These issues affect critical industries that shape the future of international markets and trade collaborations, manufacturing, and innovation.

STEM education should not be exclusive to those pursuing a degree in science, technology, engineering, or mathematics, but rather inclusive to all given the importance and omnipresence of STEM in our daily activities, actions, and decisions. Just as everyone should know the basics of financial management to make sound financial decisions and civics to understand the political and governmental process in our society, we should all have a sound foundation and understanding in STEM to be informed citizens and communicate

eloquently on scientific matters. As educators in STEM pedagogy and STEM content areas, we passionately want all students to be informed citizens who critically evaluate what is presented to them and rely on facts rather than misinformation and unfounded claims that are not based on scientific precedence or supported by well-researched and established principles. An investment in STEM education today—one that highlights practical use and emerging developments—will pay a dividend for future generations to come.

As a society, we rely on science and technology for most of today's comforts and necessities. Life-saving and life-prolonging medicines, communication technologies, modes of transportation, energy-efficient building materials, or early severe weather warning systems are just a few examples of STEM inventions with a global impact. More than ever, the future depends on STEM disciplines to support health, economic advancement, and equality for diverse populations.

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