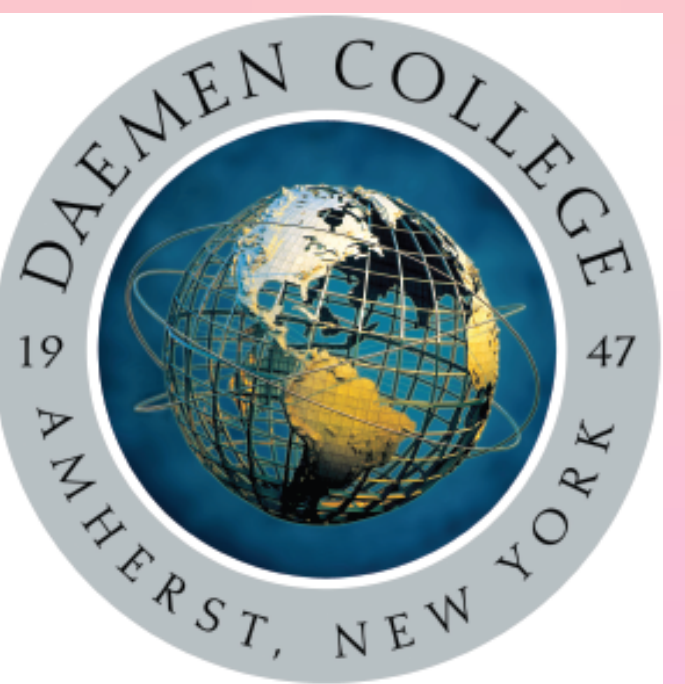
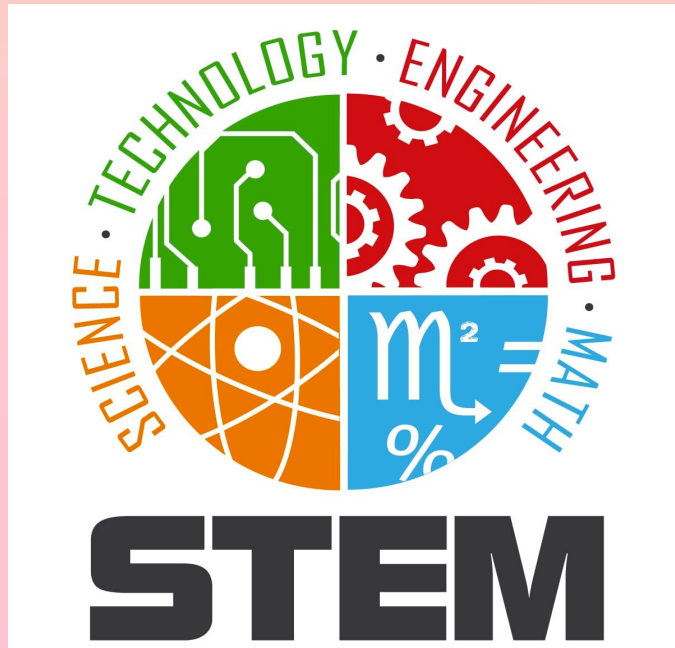


The Use of Science Technology Engineering and Mathematics (STEM) in an Early Childhood Education Classroom for Students who are Gifted and Talented

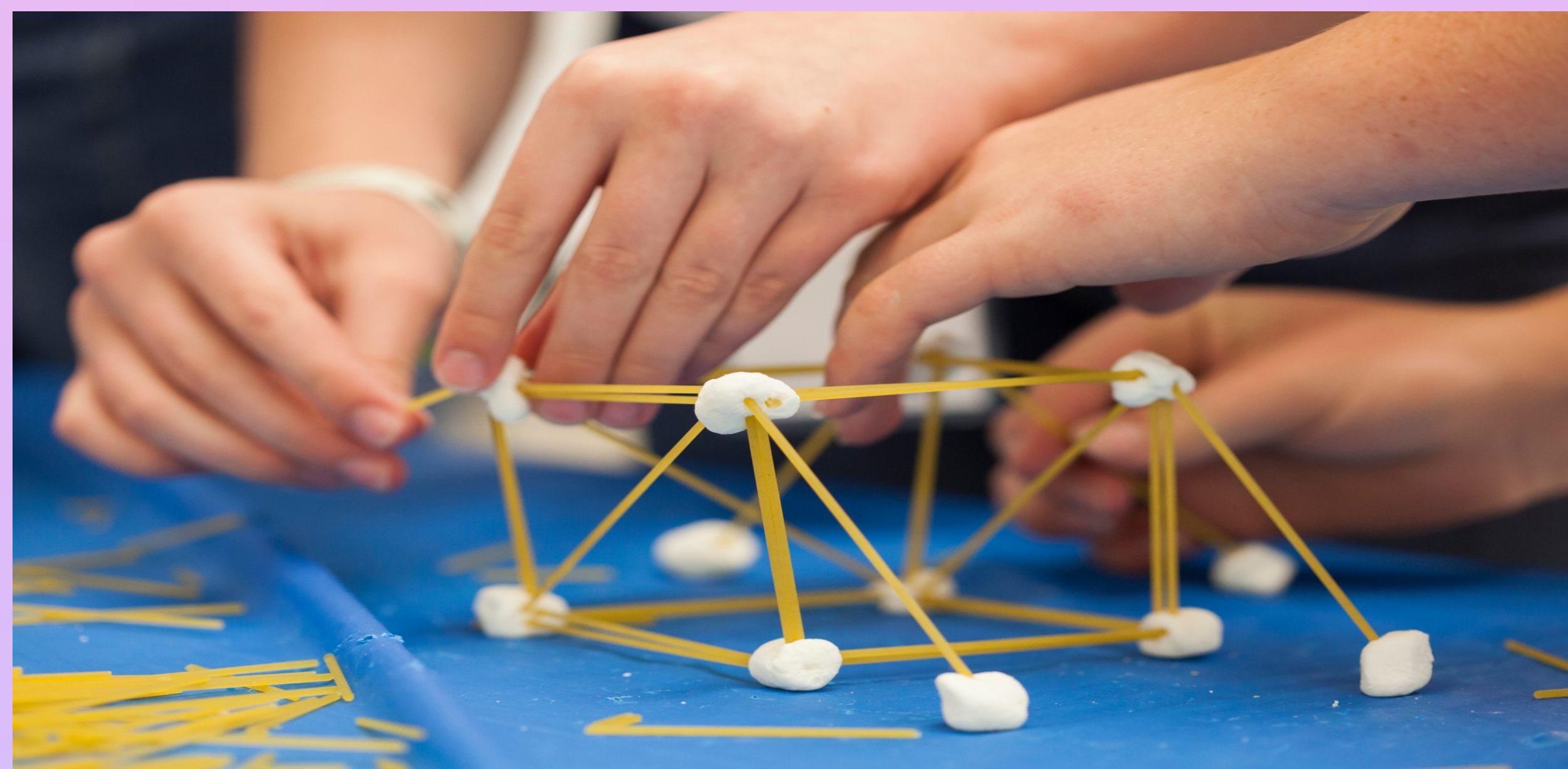
Desirae Marotta and Crystal Hammer

Education Department



INTRODUCTION

STEM is defined as a curriculum based idea of educating children with four basic disciplines, science, technology, engineering, and math. The acronym STEM was originated by Dr. Judith A. Ramaley in the early 2000's, changing SMET to STEM. STEM can be applied to all ages and curriculum both in and out of the early childhood to second grade classrooms. The early childhood educator can incorporate various hands-on activities for each subject such as making Harry Potter potions for Science, incorporating Technology through Mystery Science, creating 3-D sculptures for Engineering, and making slime or play-dough for Mathematics, and so much more. Research demonstrates how the principles of STEM can positively engage young learners who are gifted and talented. These children give evidence of high achievement capability in areas such as intellectual, creative, artistic, or leadership capacity, or in specific academic fields, and who need services or activities not ordinarily provided by the school in order to fully develop those capabilities.



BACKGROUND

In 2009, President Obama launched "Educate to Innovate" a campaign to strive higher education in mathematics and science achievement to produce 100,000 effective STEM educators. With the help of Next Generation Learning Standards, STEM became a unique learning comprehension for early childhood learners. Next Generation Learning Standards help support early exposure to STEM education as well as grasping the concept of STEM. Early childhood educators start to work on the development, implementation, and refinement of STEM in Pre-Kindergarten. It's an interdisciplinary approach to learning and the content is connected with real world lessons. Students apply Science Technology Engineering and Mathematics to make connections through various aspects of their lives. The National Research Council has identified three broad outcomes of STEM education which are an increase in training and careers, expansion of capable workforce, and increase in scientific literacy.

CASE STUDY

A study conducted by Robert Root, Bernstein Lewis Terman, Luis Walter Alvarez found a correlation between creativity and students who are gifted and talented. It shows that creativity helps people who are more broadly trained, show more interests and displays more ability and interests than the average person. There are four types of evidence that brought together the review. First, STEM professionals themselves argue that beyond verbal and mathematical skill, success requires a vivid visual and spatial imagination; hand-eye coordination and manipulative ability; skill with making and interpreting models; and a highly developed aesthetic or artistic sensibility. Second, controlled statistical studies of large groups (hundreds to thousands) of STEM professionals reveal strong correlations between artistic, musical, literary and crafts activities and measures of success in STEM subjects such as Nobel Prizes, numbers of patents or companies founded. Third, STEM professionals involved in these statistical studies themselves can describe specific ways in which their avocations stimulate their vocational successes. And fourth, many of these specific stimuli (such as improved observational and visual thinking skills, manipulative skills and tool use, and improved learning and retention strategies) also improve STEM learning in well-controlled classroom trials. The knowledge and skills required to be professionally creative are, in short, learnable. The article reviewed shows how arts and crafts stimulate creativity in students who are gifted and talented through the use of STEM. The researchers found a greater integration of knowledge of STEM within the early childhood classroom with students who are gifted and talented. STEM helps uniquely build creativity and integrated networks of enterprise and talents into a early childhood classroom with students who are gifted and talented. Early Childhood educators should be diverse enough to introduce STEM to students to exemplify the broadest range of possible arts and crafts so that individual preferences can be discovered. The curriculum gives enough time and flexibility to explore and develop deeper interests, and how creative STEM professionals have used such arts and crafts skills and knowledge.



STANDARDS

Standards: NYS Science Learning Standards
P-ESS2-1 Ask questions, make observations, and collect and record data using simple instruments to recognize patterns about how local weather conditions change daily and seasonally.
K-PS2-1 Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on motion of an object.
1-PS4-2 Make observation (firsthand or from media) to construct an evidence-based account that object can be seen only when illuminated.
2-PS1-3 Make observations to construct an evidence based account of how an object made of a small set of pieces can be disassembled and made into a new object.



CONCLUSIONS

STEM has been found to help expand the minds of young students who are gifted in talented in an early childhood education classroom in various academic subject areas such as Science, Technology, Engineering, and Mathematics. This can also be expanded by the use of STEAM (Science, Technology, Engineering, Art and Mathematics) or STREAM (Science, Technology, Religion, Engineering, Art and Mathematics) . There are a variety of ways that an early childhood educator can incorporate STEM into her/his classrooms.

BIBLIOGRAPHY

Retrieved from: <http://www.nysed.gov/common/nysed/files/programs/curriculum-instruction/p-2-science-learning-standards.pdf>
Dejarnette, N. K. (2018). Early Childhood Steam: Reflections from a Year of Steam Initiatives Implemented in a High-Needs Primary School. *Education*, 139(2), 96–110.
Root-bernstein, R. (2015). Arts and crafts as adjuncts to STEM education to foster creativity in gifted and talented students. *Asia Pacific Education Review*, 16(2), 203-212.
doi:<http://dx.doi.org.ezproxy.daemen.edu/10.1007/s12564-015-9362-0>
Tippett, C., & Milford, T. tmilford@uvic.ca. (2017). Findings from a Pre-kindergarten Classroom: Making the Case for STEM in Early Childhood Education. *International Journal of Science & Mathematics Education*, 15, 67–86. <https://doi-org.ezproxy.daemen.edu/10.1007/s10763-017-9812-8>