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The Issues: Why STEM education must begin in early childhood education [1]

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EXCERPTS

Education policy experts explore why Nevada must prioritize STEM educational experiences for all children, and why waiting until kindergarten is too late.

Research has demonstrated that the drive to explore, interact, and observe in human beings begins in early childhood, long before middle and high school, and even before elementary school. At the same time, the nation's economy is moving toward technologically based industries, creating growth in demand for workers proficient in science, technology, engineering, and mathematics. The question is, how can Nevada cultivate a generation of adults that is prepared to thrive in the 21st century economy? The answer is, begin recruiting and training them to serve in early childhood education capacities. Despite overwhelming evidence in support of this approach, high-quality STEM programming has not yet been incorporated into early childhood education.

The experts:

Jennifer Buchter, visiting lecturer in the College of Education's Educational and Clinical Studies department

Maryssa Kucskar, visiting lecturer in the College of Education's Educational and Clinical Studies department

Conrad Oh-Young, recent College of Education Ph.D. graduate

Jenna Weglarz-Ward, assistant professor in the College of Education's Educational and Clinical Studies department

Jeff Gelfer, professor in the College of Education's Educational and Clinical Studies department

These experts authored a policy paper, "Supporting STEM in Early Childhood Education," that appears in the College of Education's 2017 volume of reports for Nevada lawmakers. To read the full paper, visit the College of Education's policy initiatives site.

A few facts:

The National Science and Technology Council, along with the Committee on STEM Education, the National Association for the Education of Young Children, and the Next Generation Science Standards concur the exposure to STEM during early childhood is critical to establishing an optimal educational trajectory.

Advancing American students from the middle to the top tiers in mathematics and science is a federal educational priority.

A report by the Brookings Metropolitan Policy Program in partnership with the University of Nevada, Las Vegas, Cracking the Code on STEM: A People Strategy for Nevada's Economy, found that the K-12 education system is inadequate to address STEM educational outcomes.

By 2018, STEM-related jobs are projected to increase to nearly 50,000, a 25 percent increase from 2008 levels.

Why this matters

Why is it important to incorporate STEM education in early childhood development?

The early childhood years, birth to age 5, have long been accepted as the most critical point in neurological or brain development. Studies by the National Science Teachers Association show that young children learn through active exploration—and the drive to observe, interact, discover, and explore is inherent in their development. And it is during these years that many in the education community believe that evidenced-based STEM curricula should begin, setting children on a path to develop a love of scientific inquiry.

"During the earliest years, infants and toddlers develop 700 neural connections every second," Buchter said. "These biologically driven neurological processes and natural curiosity of how the world works make early childhood an optimal time to introduce children to scientific inquiry."

Experts further describe that this sensitive period of development must be utilized to start children on the right path to be successful in STEM, and other content areas. “Once these neurological pathways are developed, they go through a pruning process in which synapses that are not used are eliminated,” Buchter said.

In addition to developing an interest and knowledge base for STEM and enhanced inquiry skills, experts say that science instruction improves abilities in subjects outside of STEM, including literacy, language-learning, math, and executive functioning.

How should STEM be incorporated into early childhood education?

Experts say that the scientific inquiry process in STEM areas should include children engaging in active exploration opportunities that allow them to participate in the scientific process. Educators can create science experiences for young learners that include hands-on experiences that allow children to explore their curiosities and interests and develop and test theories in everyday situations.

Play-based curriculum has shown to be a particularly effective method for early learning. These practices can be directly applied to STEM and the scientific inquiry process, and can be embedded across routine activities that are already of interest to children or are part of their daily functional routines. Examples include playing on the playground, washing hands, or building with blocks. “Embedding STEM-related opportunities allows learning to occur both out of context, such as a science experiment led by the teacher, and within daily classroom situations such as caring for the class pet,” Buchter said. These small concepts allow children various opportunities throughout the day to engage in STEM concepts.

How will Nevada benefit from beginning STEM education in early childhood?

With a goal of further diversifying the Nevada economy to include more technology-related sectors, grooming future professionals to pursue STEM fields can begin in early childhood education. Sparking scientific inquiry in young students has shown to develop an affinity for STEM-related subjects that they carry with them throughout their education. With more professionals educated in the STEM field, Nevada will be able to grow economically in rapidly-growing technology sectors including biomedical engineering, systems software development, and medical sciences, to name a few. Additionally, broadening access to high quality STEM curriculum is also likely to improve the state’s overall educational outcomes, removing an additional obstacle to recruiting new businesses.

-reprinted from University of Nevada, Las Vegas
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