# Talent Development in STEM Disciplines: Diversity – Cast a Wide Net

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*Editor's Note: Talent Development in STEM Disciplines explores issues related to specialized school students in each Journal issue. Dr. Roberts invites reactions, questions, and suggestions at julia.roberts@wku.edu.*

Diverse learners are capable of becoming talented professionals in science, technology, engineering, and mathematics (STEM) - but they need opportunities to develop. "Just as in generations past, there are talented students from every demographic and from every part of our country who with hard work and with the proper opportunities will form the next generation of STEM innovators" (National Science Board, 2010). In this column I will describe diverse learners and will recommend steps necessary to recognize potential talent and provide appropriately challenging learning opportunities to develop them to optimum levels.

Diversity is a term used to denote various categories of the population for different purposes. Diverse learners who can pursue STEM careers and who are potential STEM innovators include: young people from all economic levels and all ethnic and racial groups; those who are twice exceptional; those for whom English is not their first language; those who come from rural and urban areas; and those with various special interests and talents. Diverse learners are both wanted and necessary for the talent pool of STEM innovators. However, a diverse pool may not emerge without specific, focused strategies to ensure learner development.

Children from lower income families need the support of educators at all levels to develop. Data from *Achievementrap: How America is Failing Millions of High-Achieving Students from Lower-Income Families* (Wyner, Bridgeland, & Diiulio) indicate that the number of children from low-income families in the upper quartile of achievement diminishes each year the children are in school. In elementary and high school, lower-income students neither maintain their status as high achievers nor rise into the ranks of high achievers as frequently as higher-income students (ibid., p. 5).

Despite this tremendous loss in achievement, these remarkable young people are hidden from public view and absent from public policy debates. Instead of being recognized for their excellence and encouraged to strengthen their achievement, high-achieving lower-income students enter what we call the "achievement trap"—educators, policymakers, and the public assume they can fend for themselves when the facts show otherwise (ibid., p. 4).

Without question, talented young people come from various ethnic and racial groups as well as from homes where English is not the first language. However, they are underrepresented in STEM careers. In *Mind the (Other) Gap: The Growing Excellence Gap in K-12 Education*, Plucker, Burroughs, and Song detail the growing achievement gaps among high ability groups, including gaps among children from various linguistic, economic, and racial backgrounds, in all 50 states. Federal education policy has focused on achievement gaps among children who have not reached proficiency, but policy has remained silent on achievement gaps among children who are advanced and who are at risk of not reaching levels of excellence.

Another category of potential talent can be found among twice-exceptional learners - those with a physical or learning disability who are also gifted. Children who are twice exceptional are among the most frequently under-identified children in our country. Well-known scientists who had a

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disability but also were gifted include Albert Einstein, William Faraday, Alexander Graham Bell, and Thomas Alva Edison (Force, 2007). Too often a child's disabilities may take precedence over keen interest in science and/or math and thereby limit what parents and educators think would be possible career paths for these children.

Place of residence has nothing to do with the abilities of a child but may shape the interests and opportunities that a child may have. Certainly, children from rural as well as urban areas have the potential to have outstanding STEM careers. They need to start early exploring their interests in math and science, and then they need to work hard to reach their potentials. Opportunities may be just as available in rural as urban areas to pique interests, but they may not be as evident. Potential STEM mentors in rural communities are present among business people, people in agricultural careers, and others with interests in STEM areas.

Young people's interests in mathematics and science may be diverse. Some may be very specific and do not match the school curriculum but could possibly lead to a STEM career. One example might be in computer science. Fostering such an interest can only be done if educators know about it. Finding out how students spend their time outside of school can be useful in making connections to what is being learned in class.

The national situation in regard to the development of STEM talent places the United States in a precarious position. The United States has long relied on talent from other countries to fill many positions requiring STEM expertise. That situation has changed with tightened U.S. immigration requirements and as higher education opportunities have increased in countries previously dependent on the United States. In fact, the strong, recent emphasis on excellence and innovation through education in many developing and developed countries creates a strong competitive disadvantage to the American economy over the long term, especially as the proportion of underperforming American subgroups (i.e., Hispanic, ELL [English Language Learners], and FARM [Free and Reduced Meal eligible] students) increases (Plucker, Burroughs, and Song, p. 29).

The United States stands again at the crossroads: a national effort to sustain and strengthen S&E [Science and Engineering] must also include a strategy for ensuring that we draw on the minds and talents of all Americans, including minorities who are underrepresented in S&E and currently embody a vastly underused resource and a lost opportunity for meeting our nation's technology needs" (National Academy of Science, p. 1).

The focus on developing STEM talent must start early, be ongoing, and involve young people from diverse backgrounds and with a wide range of STEM interests.

For many individuals, the development of talent seems much a matter of chance. There are fortunate circumstances of birth, and fortunate matches between a child and his or her proximal communities.... Part of our work as educators is to understand how to create conditions that allow ever-larger numbers of our youth to work toward the development of talent, irrespective of where and to whom they were born (Sosniak, p. 12).

I propose the following to ensure that our efforts to advance STEM talent development are focused and purposeful.

(1) Educators must provide opportunities for all children to make continuous progress from the day they enter school and throughout their school careers. What a simple concept, yet one that is often overlooked! Every child must be learning new things every day in school. Pre-assessment is the key to ensuring continuous progress. Assumptions about what children know and do not know may hold back children who are ready to learn at a faster pace and a more complex level.

(2) Educators must see themselves as talent developers. They must work together to combat the stereotypes that often block perceptions of others regarding who is gifted and talented and what it takes for young people with advanced ability to thrive. Stereotypes such as "they will get it on their own" and "they come from higher income backgrounds" must be changed.

(3) The reward system for schools must include accountability for the top 10 percent of the students in each grade (National Science Board). Currently, the accountability systems at the national and state levels have ceilings that are too low to detect, much less encourage, growth among the top students.

(4) Educational opportunities from the beginning of school and also at home must encourage creative thinking. *Expanding Underrepresented Minority Participation* specifies introducing concepts of creativity and discovery. The major problems confronting the world are not right-answer ones but require looking at situations and solving the problems in new ways.

(5) Summer and Saturday learning experiences must be provided and young people must be encouraged and financially supported, if needed, to participate in them. The Next Generation of STEM Innovators highlights the importance of special programs on shaping interest in STEM careers.

(6) States and school districts must continue to provide special schools and programs that tailor the curriculum to ensure the development of top-level talent in STEM disciplines. These schools and programs must recruit young people from diverse groups and work to ensure student success and continued interest in STEM careers.

(7) Diverse learners need to have role models and mentors who introduce them to careers in STEM disciplines. Role models are key to opening future career possibilities to children who are interested in science and mathematics. Children from low-income backgrounds may be familiar with few careers unless focused efforts are made for them to interact with professionals in a variety of STEM careers.

(8) Finally, educators must continually cast a wide net in the search for talent. Interests develop at different times for different people. There is not one point in a school career that talent and interest in a certain topic emerges. Rather, talent development must be considered an ongoing process.

STEM fields in the United States will be stronger when young people are well prepared to advance to high levels in STEM careers. Talent must be nurtured and a strong work ethic developed in regard to academics among diverse learners.

"Diversity is an Asset: Increasing the participation and success of underrepresented minorities in S&E contributes to the health of the nation by expanding the S&E talent pool, enhancing innovation, and improving the nation's global economic leadership" (National Academy of Science, p. 2).

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