Developing STEM Talent Among Diverse Learners

by Julia Link Roberts, Ph.D.

Developing talent in science, technology, engineering, and mathematics (STEM) is important for individuals as well as for the well-being of our country. It is essential to tap interest early in both boys and girls, children from all socio-economic backgrounds, those who have recently come to the U.S. and for whom English is not yet their first language, and young people who represent all racial and ethnic groups. Nothing in a child's background should put up barriers to cultivating interest in STEM subjects, developing an interest into a passion, following that interest into a successful college experience complete with a degree, and then pursuing a STEM career. Opportunities that spark interests and develop talents need to be available, and young people need to know about opportunities as an opportunity is not a real opportunity unless one knows about it. Advocates must follow-up and locate financial support to ensure that the opportunity is a real possibility to all who qualify.

Nothing in a child's background should put up barriers to cultivating interest in STEM subjects, developing an interest into a passion...

Currently, the U.S. is not stacking up in educating students in STEM disciplines. "America lags in providing top-level schooling in STEM fields…, and this may jeopardize our future economic growth, job creation, and international competitiveness" (Smarick, 2013, p. 12). International assessments of student performance, including the Program for International Student Assessment (PISA), show that students in other countries are outperforming U.S. students, especially in the STEM fields. These are the fields that lead to innovation and offer opportunities for high paying positions. "But, if the country is to remain competitive internationally, as well as facilitate individual opportunity and social mobility, we must face the reality that cultivating tomorrow's intellectual and scientific leaders is a key part of the education system's function" (Finn, 2014, p. 61).

Currently, far too many of America's best and brightest young men and women go unrecognized and underdeveloped, and, thus, fail to reach their full potential. This represents a loss for both the individual and society. The Nation needs "STEM innovators"--those individuals who have developed the expertise to become leading STEM professionals and perhaps the creators of significant breakthroughs or advances in scientific and technological understanding. (National Science Board, p. 1)

In *Mind the (Other) Gap: The Growing Excellence Gap in K-12 Education*, Plucker, Burroughs, and Song (2010) introduced the term Excellence Gap to describe the growing gap between the percentages of children in diverse groups and other children scoring at advanced levels in mathematics and language arts. The Achievement Gap has highlighted differences between groups of children scoring at the level of proficiency, and the Excellence Gap does the same thing but uses the advanced level of achievement as the mark of excellence. They found that few children from low-income families and few Hispanic and Black young people scored at the advanced levels on the National Assessment of Educational Progress (NAEP). The Excellence Gap also is evident in science scores (Burroughs, 2012). The Excellence Gap is so large as to be alarming; and, if something is not done about closing the Excellence Gap, it will not happen in the lifetime of current citizens. Plucker, Hardesty, and Burroughs (2013) concluded *Talent on the Sidelines: Excellence Gaps and America's Persistent Talent Underclass* with this stark statement.

In an age of increasing global competitiveness, it is somewhat harrowing to imagine a future in which the largest,

> fastest-growing segments of our K-12 student population have almost no students performing at advanced levels academically. In many states, including many of our largest, this is already the reality. (p. 29)

What strategies can change the current situation? What can you as individuals and schools do to ensure that children and young people from diverse backgrounds are prepared to be successful at STEM careers?

1. **Remove barriers to children being recognized as having the potential to perform at advanced levels.** The challenge to individuals and to schools is to remedy the problem by removing barriers to advanced learning. Advocate for policies at the school and district levels that allow children to progress based on their readiness to learn more advanced concepts and skills rather than making those decisions based on age.

2. **Foster early interest in STEM topics among all children.** Work with others to offer minds-on, hands-on learning experiences for children and young people. Volunteer in classrooms and in organizations outside of school that engage children in learning. Individuals can pique interest also by sharing stories about their passion for a particular STEM interest.

3. **Provide support for young people who are interested in pursuing STEM topics much like a coach does to ensure continuing interest in a sport.** Educators and older students can work with children and young people in various ways. Perhaps they can lend their support so a school can have a FIRST Lego Robotics team, a Future Problem-Solving team, a Odyssey of the Mind team, or any other team that encourages creative and critical thinking, problem solving, and interest in STEM subjects.

4. **Prepare young people to pursue academic work that is challenging as they develop study skills, persistence, and advanced academic skills.** It is no favor to a young person to have an excellent grade-point-average in easy classes but not have experiences to ensure readiness for success in post-secondary study. Talk with students and parents about the preparation needed to graduate from a college or university with a STEM major. Having a rigorous course of study is the necessary start for a young person planning to pursue a STEM career, and that challenge needs to be built into elementary, middle, and high school learning experiences.

"The failure of the U.S. educational system to properly nurture students from disadvantaged backgrounds may be an important contributor to the low proportion of U.S. students entering science, technology, engineering, and mathematics (STEM) fields" (Plucker, Hardesty, & Burroughs, p. 3). Specialized secondary schools can play a major role in reversing the current situation and in addressing the need for young people, including those from diverse backgrounds, to be prepared to pursue STEM careers. What will your part be in making this change happen?

REFERENCES

Burroughs, N. A. (2012, February). *Science excellence gaps in the United States*. Paper presented at the annual meeting of the American Association for the Advancement of Science, Vancouver, British Columbia.

Finn, C. E. (2014, Winter). Gifted, talented, and underserved. *National affairs* (18).

National Science Board. (2010). *Preparing the next generation of STEM innovators: Identifying and developing our nation's human capital* (NSB 10-33). Washington, DC: Author. Retrieved from http://www.nsf.gov/nsb/publications/2010/nsb`033.pdf

Plucker, J. A., Burroughs, N., & Song, R. (2010). *Mind the (other) gap: The growing excellence gap in K-12 education*. Bloomington, IN: Center for Evaluation and Education Policy.

Plucker, J. A., Hardesty, J., & Burroughs, N. (2013). *Talent on the sidelines: Excellence gaps and America's persistent talent underclass.* Retrieved from http://webdev.education.uconn.edu/static/sites/cepa/AG/excellence2013/Excellence-Gap-10-18-13_JP_LK.pdf

Smarick, A. (2013). *Closing America's high-achievement gap*. Washington, DC: The Philanthropy Roundtable.

Julia Link Roberts, Ph.D., is Mahurin Professor of Gifted Studies, Western Kentucky University and Executive Director, The Center for Gifted Studies and the Carol Martin Gatton Academy of Mathematics and Science in Kentucky