Bridging the Language Minority Gap in STEM Education

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In recent years, much research had been gathered on the importance of emphasizing science, technology, engineering and math (STEM) education in schools across our nation. This call to action has been a direct result of a need for highly skilled laborers in the workplace. According to the National Academy of Sciences’ (2007) report, Rising Above the Gathering Storm, there is a growing need for scientific and technical innovations in order to maintain America’s economic growth and vitality (Eng, 2013, p.272). Advocates for STEM education include President Barrack Obama, as evidenced in his speech at the 2011 State of the Union address in which he referred to our “sputnik” moment. His sentiment was heard loud and clear. “The more STEM knowledge students gain, the more prepared they will be for the 21st century knowledge-based economy” (Eng, 2013, p. 272). Data captured by the U.S. News and World Report further recaps the need for skilled workers to meet the growing occupational demands in STEM related fields (2011).

As a result of the current employment demands, the United States government has turned to the H-1B Visa Program to attract highly skilled immigrants with technical backgrounds. Under the Immigration and Nationality Act, firms are allotted up to 85,000 visas to recruit highly skilled “guest workers” from abroad. One of the challenges presented with this program is the lack of work opportunities once the visa expires (Eng, 2013, p. 273). The National Science Board, as cited by Moakler and Kim (p. 129, 2013) also cautioned against training and recruiting foreign students due to the anticipated reverse brain drain of American-educated, foreign born workers who can pursue employment globally. Furthermore, the General Accounting Office (GAO; 2005) as cited in Moakler and Kim (p.129, 2013) recommended investing more in U.S. human capital and focusing on U.S. student recruitment into STEM disciplines, in particular by reaching out to female and minority students. These findings reiterate the need to foster academic growth from within our own nation. This is all the more reason to take a closer look at bilingual education and the existing programs for English language learners specifically in the area of STEM education.

The truth of the matter is that students learning English as a Second language are at risk. The fact remains that school-age children who speak a language other than English at home doubled between 1980 and 2009, and they now make up 21 percent of school-age children (Huffington Post, 2013). In this same Huffington Post article, Robert Linquanti states, “Of all the challenges facing minority students and their schools, English learners are arguably the most disadvantaged. It’s hard to find enough teachers who are qualified to instruct them, and there’s little consistency in the programs used to educate them.”

According to the U.S. Department of Education (2015), the purpose of the ‘English Language Acquisition, Language Enhancement, and Academic Achievement Act,’ is to help ensure that children who are limited English proficient, including immigrant children and youth, attain English proficiency, develop high levels of attainment in English and in the core academic subject areas as well. The goal of bilingual education is to assist students with their English proficiency while helping them to adjust to a foreign environment while promoting academic success (TEACH, 2013). Although there is legislation in place to ensure equity and equality for all the disparity continues to exist.

Time and time again, there is glaring evidence that minority students are severely underrepresented in both academia and STEM careers (Williams, 2013). Museus, Palmer, Davis, and Maramba, as cited in Williams (2013) indicate several elements that negatively influence minority students’ success in STEM classes. Such factors include school district funding disparities, tracking into remedial courses, underrepresentation in advanced placement courses and unqualified teachers.

Although the challenges exist, there are numerous factors that can promote the success of ethnic minority students in the STEM field in a K-12 setting. Parental involvement and bilingual education are two factors that can promote academic achievement among ethnic minority students. Rendón and Triana (1989) as cited in the ASHE Higher Education Report (2011) found that parents of Hispanic students may not know how to engage in their children’s education. As a result of their findings, both Rendón and Triana recommend that schools involve the parents in the educational process in order for them to gain a better understanding of the importance of the mathematics and science courses being offered to their children.

Institutions that serve English language learners and bilingual students can also revisit their existing curriculum to ensure that the academic needs of the students are being met. Gándara (2006) as cited in the ASHE Higher Education Report (2011) estimates that at least 50 percent of Hispanic students in California begin with a language other than English. Consequently, a large percentage of Hispanic students struggle with a language barrier as well as experience difficulty comprehending the curriculum. Bilingual instruction in mathematics and science courses can provide students with the necessary foundational support while exposing them to the appropriate instructional STEM related content.

Culturally relevant teaching and early exposure to careers in STEM can have a positive correlation with success in STEM teaching and learning according to Museus, et al. as cited in Williams (2013). Teachers and library staff can also maintain a pro-active approach by exposing ethnic minority students to a variety of resources and multicultural contributions made to the STEM field. Such resources could be provided in multiple languages to address the language needs of diverse learners especially if their dominant language is not English.

Educational institutions can also apply for a variety of grants to promote STEM education while targeting language minority students. Schools such as California State University Fullerton are doing just that by leading a National Science Foundation project to enhance bilingual students’ knowledge of STEM education (CSUF, 2013). The institution has secured $1.5 million dollars to ease the transition of bilingual students from elementary to middle school with an emphasis on science and math which will be taught in both English and Spanish.

Most importantly, in order for language minority students to succeed they must be provided with the adequate knowledge base in science, technology, engineering and mathematics. In many instances, this information will need to be provided in the child’s home language as the students acquire the linguistic skills necessary to master English as the target language. As educational leaders, it is essential to make informed decisions based on research, policy and best practices. It is up to us to level the playing field and to provide language minority students with the tools and resources to needed to succeed in STEM related careers as we prepare them to compete in a global economy.

References

# Armario, C. (2013) U.S. bilingual education challenge: Students learning English as

# second language at risk. Huffington Post. Retrieved on April 15, 2015.

# <http://www.huffingtonpost.com/2013/04/14/us-bilingual-education-_n_3079950.html>

Association for the Study of Higher Education. (2011). Factors in K-12 education that influence

the success of racial and ethnic minority students in the STEM circuit. *ASHE Higher*

*Education Report*, 36(6), 27-52.

Association for the Study of Higher Education. (2011). Implications for future research, policy,

and practice in STEM education. ASHE Higher Education Report, 36(6), 87-126.

# California State University Fullerton. (2013). Retrieved on April 15, 2015.

# <http://news.fullerton.edu/2013fa/Latino-STEM-grant.asp>

Eng, N. (2013). The impact of demographics on 21st century education. *Society*, 50(3), 272-

282. Doi: 10.1007/s12115-013-9655-z.

Moakler, M.W., & Kim, M.M.. (2013). College major choice in STEM: Revisiting Confidence

and demographic factors. *Career Development Quarterly*, 62(2), 128-142. Doi: 10.1002/j.2161-045.2014.00075.x

National Association for Bilingual Education. (2015). Retrieved on April 15, 2015.

<http://www.nabe.org/BilingualEducation>

Schiavelli, M. (2011). STEM jobs outlook strong, but collaboration needed to

fill jobs*. U.S. News and World Report.* Retrieved on April 19, 2015 from <http://www.usnews.com/news/blogs/stem-education/2011/11/03/stem-jobs-outlook-strong-but-collaboration-needed-to-fill-jobs>

TEACH. (2015). Bilingual Education. (Web log post). Retrieved on April 15, 2015.

<http://teach.com/education-technology/bilingual-education>

U.S. Department of Education. (2015). Part A-English language acquisition, language

enhancement, and academic achievement act. Retrieved on April 15, 2015.

<http://www2.ed.gov/policy/elsec/leg/esea02/pg40.html>

Williams, T. (2013). Being diverse in our support for STEM. *Young Adult Library Services*,

12(1), 24-28.