The Graduate Review

The Graduate Review

Volume 6 | Article 29

2021

ELLs and STEM Education: Charting a Path After the COVID-19 Pandemic

Recommended Citation
(2021) ELLs and STEM Education: Charting a Path After the COVID-19 Pandemic. *The Graduate Review*, 6, 178-188.
Available at: https://vc.bridgew.edu/grad_rev/vol6/iss1/29

ELLs and STEM Education: Charting a Path After the COVID-19 Pandemic

CHRISTOPHE POIRIER
Salem State University

Within the scope of STEM-based subjects—Science, Technology, Engineering, and Mathematics—there is one group of students who has underperformed all other demographics in every category: English language learners (ELLs). As the United States falls behind other nations in creating and competing for STEM careers, this growing segment of the K-12 public school system merits closer examination. This paper will identify several items that have encumbered English language learning in this country over the past 20 years. It will look at the depreciating value of recruiting international students to fill the STEM employment void—a costly missed opportunity when compared to the economic losses sustained by under supporting the domestic ELL population. It will also address the consequences of incorporating Sheltered English Immersion (SEI) policies into the public school system, documenting national opinions of SEI and its local impact on Massachusetts over the better part of two decades. Finally, alternative solutions will be highlighted as examples for compelling ELL students to further their second language acquisition and give them reason to connect with STEM resources in the U.S.A.

One of the refrains echoed during the pandemic was how "we are all in this together." While remarkable work has helped ELLs in STEM before the coronavirus became a household name, accepting limited interactions with families post-Covid-19 is not an acceptable strategy. Traditionally, students have been relied upon as the go-to messengers, delivering lessons learned to parents, siblings, and friends. As students return to in-person learning, the public school system has an opportunity to utilize its officers to promote efficient language services and partnerships between the ELL and STEM communities. The return to school can reinforce the need for emergency bulletins, contacts, and mentors to opportunities and give students a chance to see, firsthand, how problems at home are solved with what they learn at school. The hope is that this grassroots effort will foster ambition, innovation, and resiliency along revitalized avenues of communication between classrooms and families.

Mindful living starts with personal responsibility. By making STEM a priority for ELLs, both groups will illuminate the purpose and potential of the other to immediate dividends. For a community to be healthy and prosperous, it needs to elevate examples of mutually-beneficial relationships, and there is no better time than now to learn that in school. This way the community at large can keep their neighborhoods healthy, happy, and civically industrious.

Background on ELLs and STEM

To better understand how ELLs perform in relation to STEM, it is necessary to define this significant and growing portion of the student population. According to the Glossary of Education Reform, ELLs are "students who are unable to communicate fluently or learn effectively in English, who often come from non-English-speaking homes and backgrounds, and who typically require specialized or modified instruction in both the English language and in their academic courses."[1] While the method to assess English language learners differs depending on the state, the National Center for Education Statistics (NCES) tallied ELLs as making up 10.1 percent of the U.S. public school K-12 population in 2017. This ranged from a low of 0.8 percent of students in West Virginia to a high of nearly 20 percent of students in California. In total, 5 million students were classified as ELL in 2017, an increase of 1.2 million from the year 2000.[2] By 2025, some project that 1 out of every 4 public education students in the United States will be designated as ELL.[3]

To shed light on the assessment-based performance of ELLs in STEM, the U.S. Department of Education's National Center for Education Statistics provides several data sets. By using information from the National Assessment of Educational Progress (NAEP)—which analyzes student performance in science at grades 4, 8, and 12 in both public and private schools across the nation—we can document how ELLs perform in relation to their peers. With science, the NAEP measures students' knowledge along three content areas: physical science, life science, and earth and space sciences. As the report details:

> Since 2009, the average science scores for English language learner (ELL) 4th- and 8th-grade students were lower than their non-ELL peers' scores. At grade 4, the achievement gap between non-ELL and ELL students was larger in 2009 (39 points) than in 2015 (36 points). At grade 8, the 2015 achievement gap (46 points) was not measurably different from the gaps in 2009 and 2011. At grade 12, the average scores for non-ELL students in 2015 (152) and 2009 (151) were higher than their ELL peers' scores in those years (105 and 104, respectively). The 47-point achievement gap between non-ELL and ELL 12th-grade students in 2015 was not measurably different from the gap in 2009.[4]

To recap, in science-based assessments, ELL students perform significantly lower than their non-ELL classmates, with 46 points separating the two groups at grade 8 and a 47-point difference at grade 12. This gap that showed no measurable difference from 2009 to 2015.

For measuring aptitude in technology and engineering, the NAEP uses a Technology and Engineering Literacy (TEL) assessment. It is designed to indicate

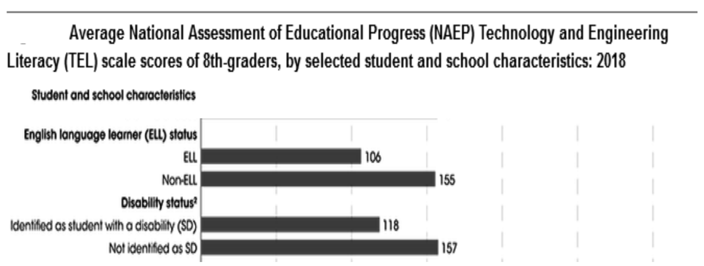
[1] The Glossary of Education Reform, English-Language Learner, 2013, para 1.
[2] The Condition of Education: English Language Learners in Public School, 2016.
[3] NEA Policy Brief: English Language Learners Face Unique Challenges, 2008.
[4] The Condition of Education: Science Performance, 2017, para 10.

how students would apply skills in real-life situations over three content areas: the effects technology has on our world, simple principles that govern engineering, and the use of computers for creative communication. Students in grade 8 at both private and public schools were incorporated in the assessment.

In 2018, the NAEP scaled the scores of the TEL, Non-ELL-status students averaged 155 points, while students with ELL status averaged 106, a difference of 49 points. The average of 106 was the lowest of all the student and school characteristics listed—lower than that of students identified with a learning disability (118 to 106), the latter defined as being on an Individualized Education Protocol or a 504 program[5] (see Table 1).

Table One

NAEP TEL Scaled Scores of 8th Graders (2018)



Mathematics proved to be the most robust STEM category that the NAEP tested, with scaled scores dating from 1990 to 2019 at the 4th, 8th, and 12th grade levels. The scaled scores for ELLs, however, are only available for the years 2015 and 2019 for specific grades:

> In 2019, the average mathematics score for 4th-grade ELL students (220) was 24 points lower than the score for their non-ELL peers (243)… [and] the average mathematics score for 8th-grade ELL students (243) was 42 points lower than the score for their non-ELL peers (285)…. In 2015, the average mathematics score for 12th-grade ELL students (115) was 37 points lower than the average score for their non-ELL peers (153).[6]

These assessments indicate that ELL students are the lowest performing demographic across all STEM categories, including high poverty and disability. Most troubling of all, ELLs do not show any measurable difference in closing the gap with their non-ELL peers.

National Support for ELLs in STEM

On December 4, 2018, the Executive Office of the President of the United States issued a press release claiming STEM as an educational priority. The National Science & Technology Council published a five-year plan titled Charting A Course for Success: America's Strategy for STEM Education. It states that:

> The Nation is stronger when all Americans benefit from an education that provides a strong STEM foundation…Even for those who may never be employed in a STEM-related job, a basic understanding and comfort with STEM and STEM-enabled technology has become a prerequisite for full participation in modern society.[7]

[5] The Condition of Education: Technology and Engineering Literacy, 2019.
[6] The Condition of Education: Mathematics Performance, 2018, para 10, 14, 17.
[7] Charting a Course for Success: America's Strategy for STEM Education, 2018, 5.

Noting the unequal access to STEM resources, and that racial and ethnic groups represent 27% of the population but comprise only 11% of the STEM workforce, the plan's acknowledgement of the limitations to STEM is important to mention.[8] The federal report concludes that by enacting a clarion call for all stakeholders, strategies need to be tailored to different ecosystems. In the entire 38-page document, however, there is no mention of ELL, English as a Second Language (ESL), Limited English Proficient (LEP), or any language support for STEM. Instead, U.S. policy appears to be recruiting international STEM candidates at the collegiate level rather than cultivating them within their borders.

Because so many of the employment opportunities orbiting STEM demand high-education degrees, U.S. companies look to international college students to meet the growing demand. The United States is the number one destination for international students.[9] In fact, hosting international students resulted in a boon for the U.S. economy; foreign students and their dependents contributed more than $13 billion to U.S. commerce in 2004-2005.[10] The heyday of the U.S. as a desirable locale for STEM candidates, however, may have reached its zenith as competition for this work force is increasing.

Between graduating with the necessary coursework, undergoing Optional Practical Training upon completing collegiate studies, finding an employer willing to sponsor an H-1B visa, and keeping a job while navigating shifting immigration policies, the steps toward entering the U.S. workforce as a non-citizen are certainly daunting. Today, international students are faced with a depreciating prospect of remaining in the United States. "Even for the best and brightest, the path to long-term residency can be lengthy, expensive, and uncertain;"[11] "a majority of international STEM and business students enrolled in U.S. higher education institutions said the best days of the U.S. economy were behind it."[12]

To only exacerbate the point, the systemic issue of a STEM labor shortage within the U.S. is already a known and alarming problem. The lack of improvement from U.S. students in math and science over the past decade and the raising of the global standard have left the United States outside the top ten in STEM-related assessments.[13] As House Science Committee Chair Eddie Bernice Johnson (D-TX) stated on March 6, 2019 "By 2050, today's minorities will be the majority. Simple math tells us that if we do not increase the number of women and minorities earning STEM degrees and participating in the STEM workforce at all levels, we will experience dire workforce shortfalls in the not-too-distant future. Some companies in the technology sector tell me the shortfall is already here."[14]

While the United States welcomed internation-

[8] Ibid.
[9] Batalova & Zong, International Students in the United States in 2015, 2016.
[10] Batalova, The "Brain Gain" Race Begins with Foreign Students, 2007.
[11] Klimaviciute, To Stay or Not To Stay: The Calculus for International STEM Students in the United States, 2017, para 11.
[12] Ibid, para 6.
[13] Johnson, Maintaining U.S. Leadership in Science and Technology, 2019.
[14] Ibid, para 6.

al talent throughout much of the 21st century, the brain waste of neither cultivating nor providing adequate STEM support to the established ELL population has resulted in an even greater opportunity cost. According to the Migration Policy Institute's 2016 report, Untapped Talent: The Costs of Brain Waste among Highly Skilled Immigrants in the United States, the U.S. has forgone $39.4 billion in annual earnings by under-employing its skilled immigrant population.[15] It would behoove the United States to invest in STEM programs that target ELLs in the K-12 public school population to plug this drain as soon as possible.

Public School Challenges for ELLs

The existing support networks and model programs at the local and national levels leave ELLs with a handful of limited options with regards to STEM. In the 2018 consensus report, English Learners in STEM Subjects: Transforming Classrooms, Schools, and Lives, the advantages of instilling STEM knowledge to the ELL population are made clear. As called upon in the preface:

> Increasing the diversity of the STEM workforce confers benefits to the society as a whole, not only due to the improved economic circumstances for a substantial segment of society, but also because diversity in the STEM workforce will bring new ideas and new solutions to STEM challenges. Organizing schools and preparing teachers so that all students can reach their full potential in STEM has the potential to transform the lives of individual students, as well as the lives of the teachers, the schools, and society as a whole.[16]

The study goes on to document the problems that inhibit ELLs. Heterogeneity among the population, a demographic that covers 150 languages, prevents a one-size-fits-all approach. Even among Spanish-speakers, a group that makes up more than three-quarters of the ELL population, individuals differ in their abilities across the four language modalities (listening, speaking, reading, and writing) due to nuances within each individual experience.

Of particular note are long-term ELLs whose English skills—despite having had six successive years of education in the U.S.—have plateaued before entering high school. For example, one embedded barrier to STEM learning for English learners is their lack of access to technology due to their placement in remedial courses. This excludes them from the science or math courses necessary for STEM advancement. Too often students have their Basic Interpersonal Communication (BIC) skills lack the Cognitive Academic Language Proficiencies (CALP) necessary for long-term success. Explaining the importance of developing these skills is tied to motivation, practice, and building a lasting relationship with the content matter. This is where teacher instruction comes into play.

In her reporting on the aforementioned document by the National Academies of Sciences, Engineering and Medicine, journalist, Sara Friedman highlighted a theme from the researchers concerning English learners in STEM subjects:

> Part of the problem for teachers is that they have not received adequate training to provide STEM-related learning opportunities for English learners in their classrooms. Teachers can also bring in biases and beliefs into their work with English learners that negatively affect learning outcomes….When teachers consistently support and incorporate English learners into classroom activities, English learners have better outcomes. English learners should also be considered at the beginning and throughout the design of curricula for STEM courses.[17]

Students deserve scaffolds that provide context and tools to support their understanding, yet placing all the impetus on teachers is unreasonable. For one, inconsistent approaches and the lack of shared resources laden the outcomes of English learners. The problem, as Friedman points out, is that "only a few states have systemic policies or programs to help teachers with their professional development in STEM related to English learners."[18] Fortunately, Massachusetts is one of those states.

Local Support for ELLs

A local program was developed by the University of Massachusetts to better prepare teachers on STEM-focused enrichment. Tied to the Commonwealth's licensure requirement, this Sheltered English Instruction (SEI) endorsement was created by the University of Massachusetts-Boston and its partner, The Center of Science and Mathematics in Context (COSMIC). Together the two created the Rethinking Equity and Teaching for English Language Learners or RETELL. By providing two graduate certificates in the Teaching of Math to ELLs and the Teaching of Science to ELLs, the programs provide teachers with standards-based instructional strategies that research has demonstrated are effective in improving ELL students' STEM performance.[19]

The issue with this program, however, is that it relies on SEI as the scaffold for teacher instruction, a policy widely looked upon as a failure for ELLs. One case study reviewed a decade of SEI in Arizona and concluded that "the current SEI program model remains structurally restrictive, appears to lack sensitivity to age and grade level differences, as well as to the linguistic and cultural needs of emergent bilinguals."[20] Locally, one need only look at the declining Massachusetts Comprehensive Assessment System (MCAS) scores and graduation rates of ELLs from 2002 to 2017. The drop in ELL performance due to SEI practices was swift and alarming due to the restrictive English-only, SEI-centered policy known as Question 2.[21] A 2010 report by Antoniya Owens titled, In the Aftermath of Question 2: Students with Limited English Proficiency in Massachusetts, states:

> In academic year 2008, 81.1 percent of the

[15] Batalova, Fix, and Bachmeier, The Costs of Brain Waste among Highly Skilled Immigrants in U.S., 2016.
[16] English Learners in STEM Subjects, 2018, ix-x.
[17] Friedman, STEM Outcomes for ELLs Fail to Meet Expectations, 2018, para 3-4.
[18] Ibid, para 4.
[19] UMB & COSMIC, Teaching STEM to English Language Learners, 2020.
[20] Cruze, A Decade After Institutionalization: Educators' Perspectives of Structured English Immersion, 2019, 449.
[21] Glatter, Massachusetts Legislature Passes Bilingual Education Bill, 2017.

> state's LEP students attended sheltered English classrooms. Seventy percent of all school districts in the state had 90 percent or more of their LEP students in SEI programs….Overall, LEP students have fared worse than their English-proficient peers in terms of school engagement. Between 2006 and 2008—the only three years for which these data are available—LEP students attended school at rates similar to all students but were increasingly more likely to be suspended compared with English-proficient pupils. In 2006, LEP students' suspension rate was 16 percent higher than the rate of their peers; in 2008, it was more than a quarter higher….LEP students were also considerably more likely to repeat a grade and to drop out of high school. And while the grade retention gap between LEP and English-proficient students declined over time, the dropout gap increased noticeably. In 2003—the only year prior to Question 2 for which dropout rate data are available—high school students with limited English skills dropped out at a rate nearly twice as high as their English-speaking classmates. By 2006, their rate had risen steadily and was more than three times as high.[22]

If SEI does not work, what is the solution for ELLs and STEM?

Motivating ELL Communities to Believe in STEM

In October of 2020, the Executive Office of Education and the STEM Advisory Council, in partnership with the Commonwealth's nine regional STEM networks, unveiled its annual Massachusetts STEM Week. The theme for its third iteration was "See Yourself in STEM". Focusing on the power of mentors, it mentioned English-language learners among those who are underrepresented in STEM industries:

> Women, people of color, first-generation students, low-income individuals, English language learners, and people with disabilities are underrepresented in STEM industries and make up an increasing portion of the overall workforce, but the demographics of STEM fields have remained largely the same. We need more young people to see themselves… in STEM fields to pursue STEM careers as well as bolster their persistence through STEM education with a mentor that is engaged, supportive, and shares in the many unique parts of their identity.[23]

A consistent recommendation for ELLs in STEM education is mentor-led interaction with the content material. Having grassroots' buy-in is also integral for there to be a lasting and constructive relationship between the ELL and STEM communities. ELLs, however, are not an easy demographic to reach. As mentioned, its heterogeneity demands multiple avenues for interaction.

While top-down shifts in how ELL is administered has largely failed its intended target audience, bottom-up solutions have proven effective with measurable success. In Owens's report on the consequences of Question 2, she spotlights Fuller Middle School in Framingham, Massachusetts as an example bucking the trend of SEI failure due to its method of both valuing and investing in its multilingual community:

> To provide LEP students with more options, schools in the district specialize in different approaches to English language support; Fuller is the district's "lab for new approaches." Fuller Middle School has a hybrid ESL/Bilingual/Sheltered English program divided into five stages: ESL 1-2 through ESL 5. The initial level offers native-language instruction of math, science, and social studies, with everything else in sheltered English….Fuller Middle School's approach to educating LEP students is in large part a community endeavor. Trilingual counselors, community-based service providers, graduate interns, and volunteer tutors collaborate to offer students continuous and wide-ranging support. Fuller also hosts an adult ESL program attended by many immigrant parents. Finally, it keeps families engaged through a series of evening events as well as new parent orientations—which, to increase access and inclusivity, offer both transportation and translation services…The academic performance of Fuller's limited English-proficient students is marked by continued excellence.[24]

This model's success shines light on an example that more schools and districts should adopt. Students are placed among classmates who scored at similar levels through diagnostic and formal assessment data rather than forced to be in a classroom with students who are further along in their English abilities. School leaders are able to communicate in both English and the students' native language of Spanish, alleviating confusion and anxiety. SEI material is provided with bilingual curricula to support students as they build common underlying proficiencies. Of additional note is the adult ESL program that allow parents and other family members to become part of the school community through courses, events, and orientations. With an outreach program that includes transportation and translation services, the Fuller Middle School is a vibrant example of a community using its resources to efficiently tie education and people together.

What Can We Do?

To see the promising potential of Massachusetts STEM Week be knotted into established community networks like the one Fuller Middle School has created would be an inspiring opportunity. Think of a district-wide STEM showcase early in the school year to gain traction and establish relationships within the school community. This would be an ELL-directed mission, partnering with other departments and local STEM-based mentors to organize connections with local fabrication labs, trade schools, and service programs. Students and their families would work alongside translators and community leaders to complete interactive activities such as the spaghetti tower, marshmallow challenge, and the egg drop test. The goal would be to tie the ELLs' native language and cul-

[22] Owens, The Aftermath of Question 2, 2010, 2.
[23] Mass Stem Week, 2020.

[24] Owens, 2010, 36.

ture as an integral asset to solving the STEM problems set before them.

A true clarion call would follow. In their article "What STEM Teachers Need to Know and Do for ELLs," Lisa Hoffmann and Alan Zollman instill teachers and mentors with a foundational concept as a stepping-stone:

> Since ELL students are emerging bilinguals (or may already be multilingual before learning English), ELL students in class are already utilizing more of their brain function than other students. So, we challenge STEM teachers to view having ELL students in [their] class[es] as having gifted students in the class. Native English-speaking students benefit socially and especially academically from having interaction with ELL students in their class."[25]

In showcasing stories of how ELLs have used STEM to solve problems in international communities—such as the iron fish addressing anemia in Cambodia[26] or the electricity-generating playground equipment in Ghana[27]—the event and its call to action would ask those in attendance to think of solutions to problems within their local environments. Teachers would supply lists of Tier 2 and Tier 3 vocabulary in English and the languages represented to promote bilingual literacy. This would support the cognitive underlying proficiency of not just students but also their families. Finally, public health care officials would offer instruction for best practices and directions on general well-being to better service the population.

Massachusetts, with its world-class institutions and history of leadership, is in a great position to be an example for the nation's ELL and STEM communities. What the Covid-19 pandemic made clear was that everyone benefits when STEM knowledge is understood and accepted. For the United States to compete with global markets, it needs the ELL demographic to continue buying into their secondary language and the connections to the STEM opportunities learning English provides. The reasons and incentives are clear. The time is now for ELLs to embrace STEM—and for STEM communities to embrace back.

Works Cited

Batalova, Jeanne. "The "Brain Gain" Race Begins with Foreign Students." In *Migration Policy Institute*, January 1, 2007. https://www.migrationpolicy.org/article/%E2%80%9C-brain-gain%E2%80%9D-race-begins-foreign-students.

Batalova, Jeanne, Michael Fix, and James D. Bachmeier. "Untapped Talent: The Costs of Brain Waste among Highly Skilled Immigrants in the United States." In *Migration Policy Institute*, December 2016. https://www.migrationpolicy.org/research/untapped-talent-costs-brain-waste-among-highly-skilled-immigrants-united-states

Batalova, Jeanne and Jie Zong. "International Students in the United States in 2015." In *Migration Policy Institute*, May 12, 2016. https://www.migrationpolicy.org/article/international-students-United-States-2015

Brownlee, John. "A Merry-Go-Round That Turns The Power Of Play Into Electricity." In *Fast Company*, September 25, 2013. https://www.fastcompany.com/3017524/a-merry-go-round-that-turns-the-power-of-play-into-electricity.

Cruze, Angela, Meg Cota, and Francesca López. "A Decade After Institutionalization: Educators' Perspectives of Structured English Immersion." In *Lang Policy* 18, 431–453, 2019. https://doi.org/10.1007/s10993-018-9495-1

English-Language Learner. In *The Glossary of Education Reform*, August, 29, 2013. Retrieved from https://www.edglossary.org/english-language-learner/. Accessed June 2021.

English Language Learners Face Unique Challenges. In *An NEA Policy Brief*, 2008. Retrieved from http://educationvotes.nea.org/wp-content/uploads/2010/05/ELL.pdf

Friedman, Sara. "STEM Outcomes for English Language Learners Fail to Meet Expectations." In *THE Journal*, October 22, 2018. https://thejournal.com/articles/2018/10/22/stem-outcomes-for-english-language-learners-fail-to-meet-expectations.aspx

Glatter, Hayley. "Massachusetts Legislature Passes Bilingual Education Bill." In *Boston Magazine*, November 16, 2017. https://www.bostonmagazine.com/education/2017/11/16/bilingual-education-massachusetts/

Hoffman, Lisa and Alan Zollman. "What STEM Teachers Need to Know and Do for English Language Learners (ELLs): Using Literacy to Learn," In *Journal of STEM Teacher Education*: Vol. 51: Issue 1, Article 9, September 1, 2016.https://ir.library.illinoisstate.edu/cgi/viewcontent.cgi?article=1009&context=jste

Johnson, Eddie Bernice. "Opening Statement," In *Maintaining U. S. Leadership in Science and Technology*: Committee on Science, Space, and Technology, March 6, 2019. http://doc.house.gov/meetings/SY/SY00/20190306/109030/HHRG-116-SY00-MState-1000126-20190306.pdf

Klimaciciute, Luka. "To Stay or Not To Stay: The Calculus for International STEM Students in the United States." In *Migration Policy Institute*, January 4, 2017. https://www.migrationpolicy.org/article/stay-or-not-stay-calculus-international-stem-students-united-states.

Massachusetts STEM Week October 19-23, 2020. In *MASS STEM WEEK*. https://www.massstemweek.org/. Accessed December 2020.

National Academies of Sciences, Engineering, and Medicine. In *English Learners in STEM Subjects: Transforming Classrooms, Schools, and Lives*. Washington, DC: The National Academies Press, 2018. doi: https://doi.org/10.17226/25182.

National Science & Technology Council's Committee on STEM Education. In *Charting a Course for Success: America's Strategy for STEM Education*. 2018. Retrieved from https://www.energy.gov/sites/default/files/2019/05/f62/STEM-Education-Strategic-Plan-2018.pdf.

Owens, Antoniya. "In the Aftermath of Question 2: Students with Limited English Proficiency in Massachusetts." In *Massachusetts Office for Refugees and Immigrants*, June 2010. http://www.doe.mass.edu/research/reports/2010/06ori.doc

Roxby, Philippa. "Why an Iron Fish Can Make You

[25] Hoffman & Zollman, What STEM Teachers Need to Know and Do for ELLs, 2016, 92.
[26] Roxby, Why an Iron Fish Can Make You Stronger, 2015.
[27] Brownlee, A Merry-Go-Round That Turns the Power of Play into Electricity, 2013.

Stronger." In *BBC News*, May 17, 2015. www.bbc.com/news/health-32749629.

Teaching STEM to English Language Learners, COSMIC (Center of Science and Mathematics in Context), University of Massachusetts Boston. https://www.umb.edu/cosmic/projects/stem_ell. Accessed December 2020.

U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. "The Condition of Education - Preprimary, Elementary, and Secondary Education - Assessments - Science Performance - Indicator May (2017)." Ed.Gov. 2017. https://nces.ed.gov/programs/coe/indicator_cne.asp.

U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. "The Condition of Education – Preprimary, Elementary, and Secondary Education – Elementary and Secondary Enrollment – English Language Learners in Public Schools – Indicator April (2018)." Ed.Gov. 2018. https://nces.ed.gov/programs/coe/indicator_cgf.asp.

U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. "The Condition of Education - Preprimary, Elementary, and Secondary Education – Assessments - Mathematics Performance - Indicator May (2018)." Ed.Gov. 2018. https://nces.ed.gov/programs/coe/indicator_cnc.asp.

U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. "The Condition of Education - Preprimary, Elementary, and Secondary Education - Assessments - Technology and Engineering Literacy - Indicator May (2019)." Ed.Gov. 2019. https://nces.ed.gov/programs/coe/indicator_snd.asp.

U.S. House of Representatives Committee on Science, Space, & Technology. In *Maintaining U.S. Leadership in Science and Technology*. 2019. Retrieved from http://docs.house.gov/meetings/SY/SY00/20190306/109030/HHRG-116-SY00-MState-J000126-20190306.pdf

About the Author

Christophe Poirier is pursuing a Master of Education in Teaching English to Students of Other Languages (TESOL) at Salem State University. His advocacy project on English language learning and STEM education was completed in 2020. Christophe plans to graduate in 2021.