

June 2019

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A Sea of STEAM

Call To Action

Dr. *Dana* Rickman

Summer Learning

Uzma Azhar



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Welcome to our latest edition of Georgia Pathways™ STEM Magazine.



It is one of the most exciting times of the year. As summer arrives, students across Georgia are embarking on enriching internship experiences and kicking the season off at coding and tech camps.

Each year, the TAG Education Collaborative (TAG-Ed) hosts programs to connect students with life-changing opportunities through STEM education. The Tomorrow's Technologist's Coding Camp, sponsored by LexisNexis Risk Solutions, is a free, four-week summer day camp open to high achieving Metro Atlanta high school students.

The TAG-Ed Summer Internship Program was created to give competitive students real-world STEM experience with companies in metro Atlanta and the state of Georgia. The internship Program is a five-week experience where students work to develop their professional aptitude while building their technical abilities. By working on relevant projects, students leave the program with tangible work experience, invaluable connections, and a passion to pursue a career in the STEM field.

These experiences not only give students real-world experience, they set them on a path that leads to careers in technology, gives them educational advantages and builds our workforce pipeline for the future.

The success of our innovation economy depends upon these STEM opportunities. Some 65 percent of school kids today will be in jobs that don't currently exist. Building skill sets and providing students with internship opportunities ensures that they are

ready for the workforce of tomorrow.

TAG is proud to support summer STEM education efforts and we look forward to following students on their journey and aiding their success.

Each month, this publication likewise supports STEM by reaching educators, students, parents and technology fans who want to inspire students and teachers to continue bolstering STEM curriculum.

Inside this edition you will find stories about STEM initiatives that may inspire you to support or start your own. You will also find examples of how students are benefiting from STEM programs.

I hope you will learn more about the value of STEM and share this publication with your networks. Thanks for your support!

Larry K. Williams
President
TAG-Ed

Larry K. Williams serves as the President and CEO of the Technology Association of Georgia (TAG) and President of the TAG Education Collaborative (TAG-Ed). TAG-Ed's mission is to strengthen Georgia's future workforce by providing students with relevant, hands-on STEM learning opportunities by connecting Technology Association of Georgia (TAG) resources with leading STEM education initiatives.

The Technology Association of Georgia Education Collaborative (TAG-Ed) strengthens the future workforce by providing students with relevant, hands-on STEM learning opportunities and connecting them to Technology Association of Georgia (TAG) resources. Formerly the TAG Foundation, TAG-Ed is a 501(C)(3) non-profit organization formed by TAG in 2002. Later, the organization's name was re-branded to TAG Education Collaborative to facilitate our role as the leaders for K-12 STEM education in Georgia.

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From the Executive Director

It's so hard to believe that summer is almost over. It feels like summer vacation just began. But I shouldn't complain. Because I'm sure for our educators... "father time" moves even faster.

Father time moves at the blink of an eye. But one thing father time doesn't control is the standards of the quality learning experiences in our educational ecosystem. And as we prepare for a new school year we want to express our appreciation for the time, effort and energy that educators invest in enhancing the daily lives and educational experiences of our students.

The Department of Education does a phenomenal job setting the STEM standards and the guiding posts to ensure valuable and enriching experiences. But recognize that our educators and educational partners work diligently to bring these standards to fruition.

We believe that meeting/exceeding the state standards is an important distinction that's worth acknowledging. Because we know that currently there is a tremendous emphasis placed on pursuing and achieving STEM/STEAM certification (and we absolutely value and honor this effort). But we also acknowledge that every day many schools strive for academic excellence and upholding (or even exceeding) state standards. And to us all of these efforts are worth applauding! Because as a result, collectively we're raising the bar in our educational ecosystem, we're making a difference and we're making an impact on the lives and trajectories of Georgia's students.

So continue to enjoy summer while it lasts. But we're definitely looking forward to the new things that are in store in the new school year.

Sincerely,

A handwritten signature in black ink that reads "Erica Moore". The signature is written in a cursive, flowing style.

Executive Director
TAG Education Collaborative



Call to Action – Supporting STEM and STEM Teachers

By Dana Rickman, Ph.D.
VP of the Georgia Partnership for Excellence in Education

Nationally and in Georgia, opportunities to participate in the growing economy and gain access to ‘good jobs’ are concentrated in the STEM fields- science, technology, engineering, and math. In Georgia specifically:

- Top growth industries are healthcare (19% by 2025) and professional, scientific, and technology (17% by 2025);
- Between 2014 and 2024, jobs in the STEM fields will grow at 16%, compared to 9% for all other fields.

Unfortunately, this trend in the labor market has the potential to decrease economic opportunities if Georgia’s citizens are not equipped to take advantage of these opportunities. Employer job postings in Georgia have grown over 150% since 2010, out-pacing the national growth rate, yet the state ranks 29th among states for unemployment.

So while the number of jobs available is increasing, many individuals remain unemployed or underemployed. These factors indicate that Georgia is experiencing a talent gap, a mismatch between the degrees and skills needed by employers and the degrees and skills of the population.

How can we close the gap? First, Georgia must continue advancing an education system that engages students all along the K-12 continuum and prepares them for these economic opportunities. The state has taken several steps to strengthen this engagement.

The Georgia Department of Education’s Vision 2020 strategic plan, for example, includes a specific goal that “(e)very child in Georgia will have access to a STEM or STEAM certified school,” thereby providing a project-based, teamwork-driven, and solution-focused framework for education. As of April 2019, there were over

70 STEM or STEAM certified schools in Georgia and over 1,000 schools working towards certification. The state has also taken legislative steps to close the gap. In 2019, for instance, Georgia passed Senate Bill 108, which will ultimately require computer science course offerings in middle and high school.

state must overcome is the shortage of teachers caused in part by the high levels of attrition, especially in the STEM fields. Approximately 70 percent of teacher hiring statewide is done to replace teachers who left the workforce. Since 2010, 13 percent of Georgia's newly hired teachers left the workforce after their first year.



These are excellent steps to prepare Georgia's students for the workforce of today and tomorrow. However, one hurdle the

After five years, 44 percent of newly hired teachers in 2010 were no longer teaching.

Compiled by Georgia Chamber of Commerce 2030, JobsEQ Analysis.
Change the Equation. (n.d.). Vital Signs - Georgia STEM Demand. Retrieved October 30, 2016, from Vital Signs: <http://vitalsigns.changetheequation.org/state/Georgia/demand>
Metro Atlanta Chamber of Commerce. (2016). Georgia: Your Talent Your Future, Educators and Policy Makers Report. Atlanta: Metro Atlanta Chamber.
Bureau of Labor Statistics, Local Area Unemployment Statistics, April 2019.
Georgia Department of Education. (2016). Vision 2020 - Educating Georgia's Future. Retrieved from Georgia Department of Education: http://www.gadoe.org/Documents/VISION_2020.pdf
Georgia Department of Education. (2016). Vision 2020 - Educating Georgia's Future. Retrieved from Georgia Department of Education: http://www.gadoe.org/Documents/VISION_2020.pdf

Attrition among high school teachers is particularly problematic since high school teachers are not produced at replacement levels in Georgia. Among those teaching high school math and science, attrition is just as discouraging, with 44% of math teachers and 42% of science teachers leaving the classroom within the first five years.

Access to a high-quality teacher in the STEM fields becomes even more problematic for low-income and minority students. In their 2018 report on Georgia's teacher workforce, the Governor's Office of Student Achievement (GOSA) compared workforce patterns between high-poverty and low-poverty schools. The study found, that compared to their low-poverty counterparts, high-poverty schools¹⁰:

- Had statistically significantly smaller share of teachers with a Master's degree as their highest earned degree
- Were more than twice as likely to have a teacher teaching out of field
- Had significantly fewer teachers certified in STEM.



Georgia is exploring new ways to strengthen the number of teachers in the STEM fields throughout the state, particularly high-needs communities. For example, the Woodrow Wilson Georgia Teaching Fellowship program was established to help meet this need.

This program partnered with five universities and school districts to 1) recruit high ability individuals with an undergraduate degree in math or science to prepare them to teach in those subjects in high-need schools for a minimum of three years, and 2) to transform the teacher education programs that prepare science and math teachers at participating universities with the goal of creating models for the state and the nation.





While the initial funding for the fellowship program is ending, the investment is yielding results. During the program's first three years, 133 (96%) of the fellows certified through the program were placed in high-need school districts across the state, and all the participating universities have transformed their curriculum and are working towards sustainability and diffusion of the program.

Ultimately, with more than 60% of students enrolled in Georgia's public schools being low-income, the state must support its STEM education program efforts with a comprehensive plan to recruit and retain high quality teachers in the STEM fields. These professional educators are essential to help our state meet its economic development goals and ensure all citizens benefit from its economic growth.

GOSA defined high poverty and low poverty schools by identifying the top and bottom quartile of schools using free and reduced lunch direct certification percentages.

Governor's Office of Student Achievement. (2019, January). 2018 Georgia K-12 Teacher and Leader Workforce Report . Retrieved from Governor's Office of Student Achievement: <https://gosa.georgia.gov/research-reports>

Dana Rickman, Ph.D., Vice President, Georgia Partnership for Excellence in Education.

Dana joined the Partnership in July 2011 after serving as the Director of Research and Policy at the Annie E. Casey Foundation – Atlanta Civic Site. She has also worked for more than 10 years at Georgia State University conducting research on education programs within Georgia. She holds a PhD from Georgia State University in Political Science and a BA from Mary Washington College. She has authored multiple articles in peer reviewed journals and book chapters related to education policy and is the primary author of the Georgia Partnership's annual Top Ten Issues to Watch report.



Swimming in a Sea of STEAM Stuff:

How to choose the right STEM product or service to meet your needs (Part 1)

by Scott Davidson

This article is part 1 of a 3-part series addressing smarter consumer decision-making when it comes to STEM programming and services.

STEM and STEAM: these are the ubiquitous acronyms in a field that loves acronyms. It seems that everywhere we look, vendors are rushing to offer a new product or service to capitalize on the STEM and STEAM trend. So, how do we make informed consumer decisions when there is so little agreement (and good data) regarding effective STEM programs? Advanced/Measured Progress has invested a great deal of time considering this very issue, and we hope that we can help to remove some of the guesswork.

Before we jump into the details of determining whether or not STEM products and services are informed by and built on evidence-based best practices, we need to start with the vetting process and matching potential vendors to your unique needs. Let's cover two key starting points that will support your overall decision-making process: your STEM Brand and your STEM Plan.



Your STEM Brand

Whether or not you are aware of it, your school has its own brand. School brands are reflected in the unique contexts, experiences, and perceptions that are shared by the stakeholder community. Organizations with effective branding are able to shape each of these areas to build strong consumer relationships.

Chick-fil-A is a great example of a brand that has made important decisions that have separated them from the fast food pack. For starters, Chick-fil-A decided to sell chicken sandwiches instead of hamburgers. Bringing chicken to a hamburger fight in a nation where beef has almost always been the meat of choice might seem like a risky move. But offering the chicken sandwich in the face of so many hamburgers has actually represented a key differentiator between Chick-fil-A and its competitors, and this distinction is always reflected in Chick-fil-A's marketing and advertising.

Also consider that Chick-fil-A decided to close on Sunday. How has this impacted Chick-fil-A's bottom line with competitors who have an extra day to generate revenue? In 2018, Chick-fil-A earned more per restaurant than the top 3 fast food restaurants combined. This is partially a result of customer loyalty to the Chick-fil-A brand, which is itself influenced by Chick-fil-A's own commitment to a set of core beliefs.

What does chicken have to do with STEM and STEAM?

The point is that Chick-fil-A is a widely successful organization, in part, because they make strategic decisions based on their brand identity. Whether you are a STEM school or a school doing STEM things, it is important that the products and experiences presented to your consumer audience (most often students, teachers, and families) strengthen their perception of your institution's brand. You can and should identify how your STEM programming represents a differentiator among other schools in your area; then focus on how you can emphasize those differentiators through experiences.

When evaluating different options for STEM programming, ask yourself whether a particular product or service will strengthen or dilute your brand. Let's imagine for a moment that your school is committed to a focus on environmental science. This focus should not necessarily exclude you from purchasing your very own fleet of drones, but you have to be able to position your investment in drone technology in light of your focus on environmental science.

How will the drones support your environmental science program? If your team does not understand how a new component fits in with the overall vision, then they are likely to see the investment as a fleeting novelty, or worse yet for the



teaching staff, another “thing” being added to their already full plates. There is a good reason that most schools have that closet full of unused resources dating back to 1980’s.

Take away: If the product or service offered is not aligned to your core identity, then it has the potential to create confusion among your various stakeholders.

Your STEM Plan

Recently, I was working with a school district that would like to transform teaching and learning in several schools. The end goal is to have these schools truly be STEM and STEAM schools. These changes will take significant investments in time, human capital, money, and community resources. The system had received a bid from a vendor for overhauling the curriculum in the target schools.

The proposed services would consume about 75% of the district’s budget for the project. Curriculum, while a vitally important component of STEM institutions, is not the only change required for schools to move from a traditional model to one that reflects a STEM culture of learning. In this case, there was not a question regarding the quality of the services offered; they were truly excellent.

However, the ultimate result of the work would leave the district short of their goals with limited resources to complete the project. It is difficult to blame leaders in cases where they invest in solutions that only partially address their needs. If you are not sure what the right solution looks like, it can be easy to believe that a quality product is the best answer. In order for schools to make an informed decision, they need to have a clear plan and a good understanding of the design of products and services that will fit their plan.

In many cases, STEM represents an add-on or supplemental set of programming for schools. In some schools, STEM is part of the core identity of the institution.

The specific context of your school will influence the scope of your plan, but, whatever the scale of your STEM implementation, it is important to make sure that resources are working together and in the same direction. This can only happen when your team has identified a clear set of intended outcomes for your initiatives. Goals for impactful STEM programming might include student engagement, teacher practice, community interest, student performance, or an array of other areas. It is quite possible that your STEM plans will include several of the above. The most important commonality among plans of any scope is a theory of action that connects resources and actions with outcomes.

In the specific scenario above, as in many cases, there was most likely no ill-intent on the part of the vendor. While there are certainly some dishonest companies out there, most sales professionals are aware that longevity does not result from dishonest business practices. But vendors are essentially solutions in search of a problem. The market often incentivizes positioning very specific products and services as solutions to broad, complex needs. As the old adage goes, “When the only tool you have is a hammer, every problem looks a lot like a nail.”

An effective approach to implementation will benefit from understanding how the design of STEM products and services might support your goals. Start by clarifying what the products or services are actually designed to do. Make sure that your discussion with a vendor is based on your needs and that their solution is designed to address needs like yours.

Ask about their work with schools like yours and the examples of successes with their services. Also determine if the company maintains results-oriented data. Customer testimonials are wonderful, but they are often crafted to fit a marketing agenda. Ideally, the vendor can demonstrate that they have been able to provide cost-effective customization that aligns to unique customer goals.

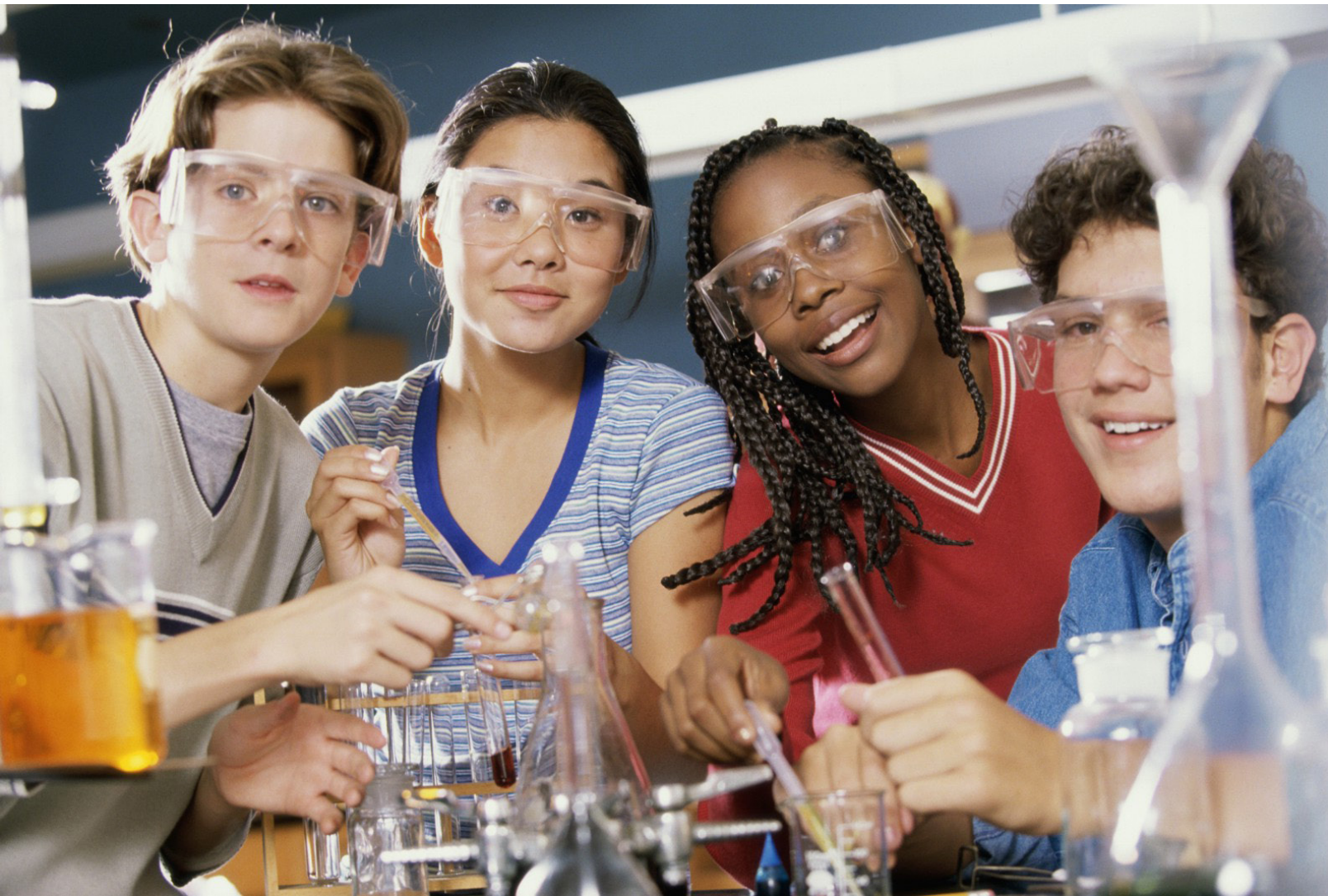
Take away: If the design of a STEM product or service does not align to your needs, it is likely to divert valuable resources from key initiatives.

Stay tuned for Part 2 of this 3-part series, where we will address how to ensure that materials and experiences provided by STEM Provider programs reflect the best that evidence-based practice has to offer.

Note: According to the Earth Policy Institute, chicken only displaced beef as the meat of choice for Americans in 2014.

See Matthew McCreary’s article in Entrepreneur magazine, “Chick-Fil-A makes more per restaurant than McDonald’s, Starbucks, and Subway combined. . .” <https://www.entrepreneur.com/article/320615>. Retrieved June 27, 2019.

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Rural Georgia Teachers to Receive Training Thanks to New State Budget

By Jessica Szilagyi

Public-private investment will prepare 8th-12th grade students in rural communities for careers in biomanufacturing of agriculture, medicine, food and beverage products.

Thanks to the recently enacted FY 2020 budget for Georgia, funds to support life sciences education in rural school systems through the Georgia Department of Education and the Georgia Youth Science

& Technology Centers have been allocated and will soon change what high school students learn.

The new training for teachers will be administered by Georgia Bio, Georgia's trade association which focuses on driving growth in Georgia's biosciences industry and its many sectors, including agri-biotech, food and nutrition, bio-based technologies and renewable chemicals.



“The life sciences industry is a leading driver of employment nationally, but leaders express concern about the availability of a strong workforce,” Georgia Bio President & CEO Maria Thacker-Goethe said in a press release. “We need educators to be aware of the vast, high paying jobs available in the life sciences industry here in Georgia. By expanding our proven teacher trainings statewide, we will equip educators with the academic, technical, and leadership skills to meet the students’ interests and industry’s needs.”

students to work in biomanufacturing and the emerging biotech industry. These hands-on applications of STEM learning will solidify what students learn in other classes, as well as provide skills required for tomorrow’s workforce.

According to a press release, Georgia Bio’s membership has been supporting these initiatives for years. Adding State support improves alignment to fuel a high growth, high income industry through educators and students in rural Georgia. Georgia Bio recently reported that employment in the life sciences industry grew by 14.9 percent between 2007 and 2017, a rate nearly twice the national average.



These trainings are the first of their kind nationally and set Georgia to be a premier training location for this skilled workforce. Curriculum developed in collaboration with the Georgia Institute of Technology and University of Georgia, specifically the Center for Cell Manufacturing Technologies (CMaT), will prepare

Summer Learning

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SUMMER presents a myriad of experiences for most middle- and high-income students. They have opportunities to gain knowledge through family vacations, museum trips, summer camps, and having access to books and other learning materials.

Unfortunately, low-income students often lack opportunities during the summer and suffer the “Summer Slide” or summer learning loss. This is a decline in reading ability and academic skills that can take place during the summer months. Most students lose two months of mathematical skills every summer, and low-income children typically lose another two to three months in reading.

What Does This Mean?

Students start the new school year in a worse position than when they finished the previous school year leading to 9 in 10 teachers spending at least three weeks re-teaching lessons at the start of the school year. This loss of skills is cumulative and will build up over the years and can leave low-income children 2.5 - 3 years behind their peers by fifth grade.

In fact, summer learning loss during elementary school accounts for two-thirds of the achievement gap in reading between low-income children and their middle-income peers by ninth grade.

**Building
Brighter
Futures**



This is

Summer Learning



Children face other adverse effects during the summer as well. In July 2017, only 1 in 7 children who ate a free or reduced-price school lunch during the 2016-2017 school year were reached by the federal-funded Summer Nutrition Programs, which include the Summer Food Services Program and the National School Lunch Program. This means that 6 out of 7 children are going hungry during the summer months.

Many families struggle to find high quality, affordable summer programs in Georgia. According to a survey conducted by the Afterschool Alliance, 25% of Georgia families reported having one child enrolled in a summer program, while 42% of Georgia families reported that they would like to enroll their children in a program if it were available.

Furthermore, the same survey showed that Georgia families pay on average \$302 per week for their child's summer learning program, higher than the national average.

What Can We Do?

Quality summer programs play a critical role in inspiring learning, providing enrichment activities, keeping kids safe and healthy, and supporting working families. They can drastically help mitigate adverse effects for low-income youth and are a critical strategy in eliminating the opportunity and achievement gaps that persist across communities in Georgia. For example, elementary school students with high levels of attendance (at least five weeks) in voluntary summer learning programs experience benefits in math and reading.

Some examples of quality summer programs include the following:

- Bricks4Kidz Summer Camp program offers S.T.E.A.M immersion and education through unique, fun & engaging LEGO camps to children ages 3 - 13. Students embark on complex and innovative LEGO-building projects to build creativity, hands-on problem-solving skills, and confidence while immersing them in math, engineering, and science.
- CEISMC's Summer P.E.A.K.S. are hands-on, interactive learning experiences that give participants the chance to learn coding, robotics, app creation, biotechnology, and more at Georgia Tech.
- Generation Infocus uses project-based STEAM learning to engage young minds and foster 21st century career champions by providing STEAM Lab workshops, tutorial support in math and reading, STEAM career workforce exposure, social and emotional education.
- Starbase Robins strives to pique students' interest with a unique STEM curriculum that includes hands-on activities in Physics, Chemistry, Technological Advances, Engineering, and Mathematical Operations while developing students' skills of teamwork, communication, critical thinking and problem solving.
- STE(A)M Truck is a growing fleet of innovation labs that brings tools, technologies, and community expertise directly to youth.

It provides participants with hands-on, minds-on experiences aligned with both classroom curriculum and 21st century skill sets and provides coaching and technical assistance to adults to continue programming.



How Do We Do It?

Rand Foundation's "Getting to Work on Summer Learning" can equip us with some recommended best practices for summer learning programs: The report also discusses the costs associated with offering a voluntary summer program and provides suggestions for lowering them, such as working with community-based organizations and consolidating program sites into as few buildings as possible. Creating summer learning opportunities for youth is the best way to enable them to develop critical thinking and leadership skills, use innovation and creativity, and prepare them for success.

Cooper, H., Nye, B., Charlton, K., Lindsay, J., & Greathouse, S. (1996). The effects of summer vacation on achievement test scores: A narrative and meta-analytic review. *Review of Education Research*, 66 (3), 227-268. Surveyed by the National Summer Learning Association. *New York Times*. (Feb 9, 2012). Education Gap Grows Between Rich and Poor, Studies Say.

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Catherine H. Augustine, Jennifer Sloan McCombs, John F. Pane, Heather L. Schwartz, Jonathan Schweig, Andrew McEachin, and Kyle Siler-Evans. *Learning from Summer: Effects of Voluntary Summer Learning Programs on Low-Income Urban Youth*. RAND Corporation. (September 2016). Schwartz, Heather L., Jennifer Sloan McCombs, Catherine H. Augustine, and Jennifer T. Leschitz, *Getting to Work on Summer Learning: Recommended Practices for Success*, 2nd Ed., Santa Monica, Calif.: RAND Corporation, RR-366-1-WF, 2018. As of June 05, 2019: https://www.rand.org/pubs/research_reports/RR366-1.html



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Teaching as a **STEM** Career

by *Betsy* Hill

President of BrainWare Learning Company, a provider of cognitive literacy solutions.

Lists of STEM careers typically include things like environmental science, electrical engineering, software development and market research analysis. Teaching isn't usually on the list but perhaps it should be, particularly given the nature of the job as it continues to evolve. The reasons go beyond the obvious fact that teachers of science, technology, engineering and math have to have mastered knowledge and skills in those areas.

Considering what teachers today have to know and do that they didn't ten or twenty years ago, the need for STEM skills, across the board in teaching, becomes evident.

In terms of science skills, for example, teachers are increasingly interested in and being trained in aspects of neuroscience that have implications for learning.



Learning, after all, is a biological process – the making and strengthening of connections among neurons into neural networks or maps. Many teachers are deeply engaged in the science of learning and teaching. Some may argue that teaching is an art as well as a science, and that is the case.

At the same time, there are many software programmers who will talk about the art of their discipline. Just because we are artful doesn't mean we aren't relying on sound science in performing our roles as teachers or programmers.

When it comes to technology skills, teaching is vastly different than it used to be. When I started teaching, there was a ditto machine and there were correcting typewriters. There was a card file in the library. Today, I teach in a high-tech classroom where remote participation is allowed, even encouraged and students collaborate on Google Docs. I grade assignments, schedule classes, and manage my course, all online. No tree dies as result of their final project presentations. If you can't stand the technology, get out of the classroom.

Similar trends are beginning to emerge for engineering and math. When teaching becomes informed by neuroscience, then learning becomes an engineering problem. The teacher's job is not to convey knowledge, but to engineer learning experiences that are designed to develop the particular skills and to create strong

neural connections that can be reactivated later when the information or skill is required. For math, the application of statistics to understanding the increasingly large amounts of data that are available are probably the areas where the demands have increased the most.

Cross-Disciplinary Skills

The literature is full of lists of skills that apply across STEM fields. They include skills like problem-solving, data-driven decision-making and statistics.

Problem-Solving

The school day is filled with problems. Some are small and routine, with routine answers. But many require novel solutions, often because of the unique characteristics of the people involved (children, parents, teachers). A young teacher friend discovered that a significant number of his 10th grade English students had plagiarized other sources on a recent assignment. As a problem, it might seem simple – after all, plagiarism is a clear violation of school policy.

But as this teacher worked through the issues, the problem morphed (as problems often do), and required him to figure out how to create a response that was fair (after all, many students produced excellent work without cheating), and make it a truly teachable moment that would have a long-term impact. Problems like these require all of the skills

that I teach my MBA students – how to define a problem, how to analyze the cause and effect relationships, how to develop multiple alternative solutions, how to evaluate those alternatives and then ultimately how to make and implement the decision.

Data-Driven Decision-Making

Today, educators, like just about everyone alive, have access to more data than they know what to do with. And they are supposed to use it for decision-making. Formative assessments are supposed to inform instructional decisions. Teachers evaluate test data and other performance measures to figure out what material needs to be presented again, which students need which kinds of supports, and, in the context of MTSS (Multi-Tiered Systems of Support), which interventions are best-suited to address student learning and behavior gaps. Books like *The Data-Driven Classroom* (ASCD, 2014) reveal how crucial it is becoming for classroom teachers and building-level administrators to understand how to utilize data in making decisions, a virtual impossibility without an understanding of statistics.

Vital Social and Emotional Skills

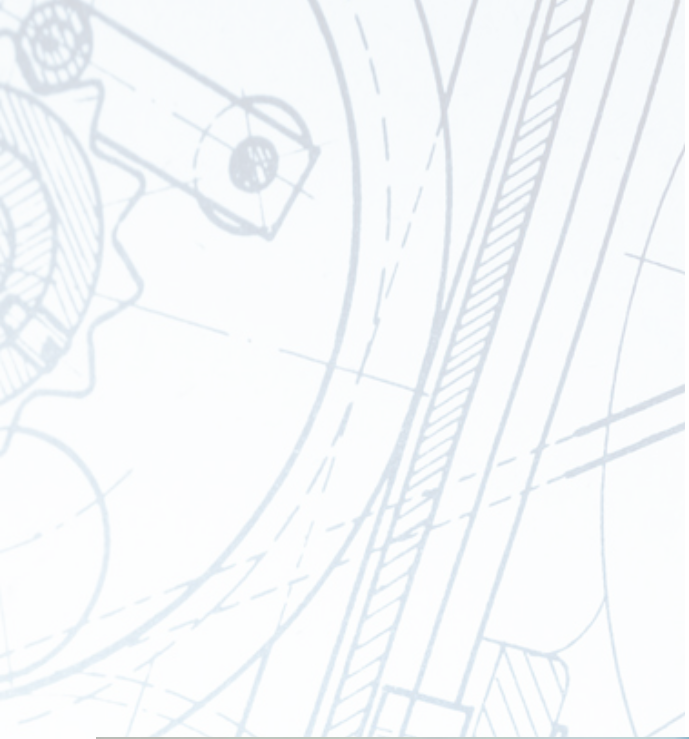
When Google, an iconic example of a STEM career opportunity, analyzed the traits that accounted for success at Google, technical skills were seventh on the list.

All of the higher-ranked skills were “soft skills,” what we would call social and emotional skills in education:

- Being a good coach
- Communicating and listening well
- Possessing insights into others (social awareness)
- Empathy and support toward colleagues

The first soft skill begs a question: “What is the difference (if any) between teaching and coaching?” An online search will produce many examples of opinions that teaching is about the teacher and coaching about the student, or that teaching is about transmitting information while coaching is helping create the environment for development to take place.

As teachers become more scientific about learning, it is all about the student and creating learning experiences. If there is a difference, it is one without a distinction. Teachers spend most of their days communicating and listening. Often, they have greater insights into their students than anyone except those students’ parents (and sometimes greater). The need for empathy and support for colleagues is a skill whose value is becoming increasingly clear as teaching becomes more collaborative and teachers work together in professional learning communities. The best practices of developing these skills are or need to be built into the teaching profession, just as they are for any STEM profession.

A light blue background featuring a technical drawing or blueprint with various lines, circles, and geometric shapes, suggesting a STEM or engineering theme.

Teaching is changing from a folklore-driven profession to an evidence and data-driven profession. As is the case for many STEM careers, there is still art involved, but there is also vastly more science and research than ever before.

The good news is that teachers' own experience with STEM skills will be extremely valuable when it comes to teaching those skills to students and preparing them for their future STEM careers.



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