

June 2018

GEORGIA PATHWAYS

M A G A Z I N E

Digital Divide in Georgia

Veterans at **GT**

STEM Integration in English Class



TAG

Technology Association
of Georgia



TAG-Ed
Education Collaborative

Statewide Call

for Nominations and Applications for 2018 STEM Education Awards

The Technology Association of Georgia and the TAG Education Collaborative are excited to announce the 7th Annual STEM Education Awards. This event will recognize and honor schools, programs and organizations for their outstanding effort and achievement in supporting and promoting STEM Education in Georgia.

Individuals, schools, companies, and organizations are invited to nominate themselves or others by completing the online survey found at <https://www.surveymonkey.com/r/B78DKJH>. Application process opens July 23rd, 2018 and Nominations are due by 4:00PM August 31st, 2018.

Application categories include:

- **Elementary School**
- **Middle School**
- **High School**
- **STEM Certified School Outreach**
- **Post-Secondary Outreach**
- **Extracurricular Program**
- **STEM Day Activity**
- **Corporate Outreach**



Finalist will be notified by October 5th, 2018.

The 7th Annual STEM Education Awards event will be held on November 2nd, 2018 from 11 am -3 pm at the Loudermilk Center. For more information please visit <http://www.tagonline.org/events/stem-education-awards/> or contact Dr. Reginald Turner at reginald@TAGonline.org or 404-920-2017





Georgia Pathways STEM Magazine seeks to bring attention to the ways in which we can foster, celebrate and innovate STEM fields and education programs -- and the opportunities that exist for meaningful career pathways in science, technology, engineering and math.

The hope is that by sharing meaningful, interesting and useful content, we help create and fuel an ecosystem that is increasingly accessible to learners and educators across a spectrum of backgrounds, geography and interests.

By continuing to read and engage with us through this medium, you become a part of that mission. I hope that you will continue to share each edition, with your networks so that we can continue to raise awareness and encourage students and teachers who are building the momentum around STEM education.

As summer begins to come to a close, be sure to leverage the features from our thought leaders, as well as the stories of students who are finding their way from classroom to career through STEM pathways.

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.

PRESIDENT/CEO
Larry K. Williams

PUBLISHER
Wayne Carley

EXECUTIVE DIRECTOR/EDITOR
Errika Moore

CONTRIBUTORS
Mary Kay Boler, TAG-Ed Staff
Shanice Saunders, TAG-Ed Staff
Dr. Reginald Turner, TAG-Ed Staff

The Technology Association of Georgia (TAG) and
TAG Education Collaborative
75 5th Street, Suite 625 Atlanta, GA 30308

<http://www.tagedonline.org>

This magazine services the STEM education industry needs of the state of Georgia. This magazine is viewed by the consumer with the understanding that the information presented is from various sources from which there can be no warranty or responsibility by the Technology Association of Georgia, the Technology Association of Georgia Education Collaborative and/or their affiliates as to legality, completeness or accuracy.



Equity in Education

Gary Brantley / DeKalb County

Veterans at Ga. Tech.

Dr. *Kata* Dosa / Ga. Tech.

Robotics in K-5

Stan Hickory

HYPE / Hope for Youth

Kristina Smith

Brain Burnout..Rewire!

Dr. *Judy* Willis

STEM Integration

Wayne Carley

From the Executive Director

In the Northern hemisphere, the beginning of the traditional astronomical summer is June 21. And according to Wikipedia, “June in the Northern Hemisphere is the seasonal equivalent to December in the Southern Hemisphere. What’s great about “every day cycles” is that there is natural order to the “sciences” of life. And it’s truly amazing to watch students discover the nuances of those sciences that naturally happen around them.

During this time when change happens annually, isn’t it ironic that it coincides with a time frame where students (in the Northern hemisphere anyway) can take time to discover, learn and actually engage in the changing nuances of life...on their own time...and on their own schedule. During the school year they’re empowered to engage in new topics and make new discoveries. But during the summer they have the time and the opportunity... to dive deeper.



In fact, every month, with each issue, we encourage parents, teachers, educational champions and students to discover what’s new in STEM.

According to Webster, the definition of DISCOVER is “to see, find, or become aware of (something) for the first time; to show the presence of (something hidden or difficult to see); to make (something) known; or to learn or find out (something surprising or unexpected).” How phenomenal would it be if students were given the freedom, the capacity or even the autonomy to find something for the first time.

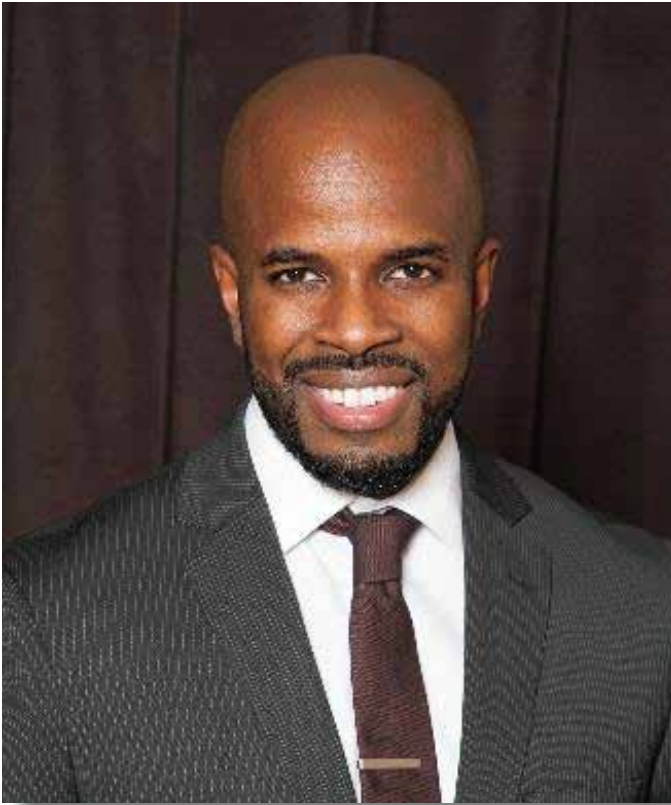
Hurray! Summer won’t last forever! So while you can, take the time to help students discover something new, find something surprising or become aware of something they didn’t know before. Sincerely,

A handwritten signature in black ink that reads "Erika Moore".

Executive Director
TAG Education Collaborative

Equity in Education: Steps to Bridging the **Digital** Divide

BY *Gary* BRANTLEY



It's safe to say I'll never forget the celebration we had in late August 2017. More than 350 students joined their parents, DeKalb County School District officials, Sprint Foundation guests, and local media at Cedar Grove High School to claim their mobile hot-spots. This celebration kicked off the district's Digital Dreamers 1 Million Project and the district-wide distribution of 25,000 mobile hot-spots. These hot-spots are now providing households up to 3GB per month of free Internet connectivity.

As the chatter and excitement grew, my Information Technology team and I felt a sense of pride as we witnessed the payoff of our hard work. But, what these students didn't realize in the midst of their celebration was that the tools and forthcoming components of the \$30 million Digital Dreamers project put them one step closer to an equal playing field with other students from across the globe. These students had yet to understand that they are now a vital part in the equity in education movement that I've worked with my team and district leaders to create. This initiative came to fruition over a six-year planning period.

The following is a summation of the most important steps we took at ensuring a fair and inclusive system for the entire district.

Create a Strategic Vision: Build the plan, and then work the plan — That's where it all starts. It's important for this plan to delineate objectives, time-lines, and roles, but to also seamlessly correspond with your organization's identity — the existing strategy, goals, mission, and vision.

Conduct Extensive Research: Identifying, understanding, and entrenching yourself in the culture of the organization is an essential part to any research process, followed by a thorough and transparent needs assessment. This assessment and information gathering requires listening and engaging with organization stakeholders to accurately determine where the equity divide is most detrimental.

Leverage Relationships: I've been very fortunate to work with and learn from several influencer's in education, technology, and business, which has allowed me to turn these connections into resources that create unmatched opportunities to move not only DCSD, but other organizations I serve forward. These relationships stem from genuine connections, I've made over my 20-year career and allow me to

better, more organically advocate for vital funding by aligning myself with community partners and business organizations.

Keep in mind that leveraging authentic relationships, also comes with learning the "politics" of a given space and industry. But, don't allow this necessary part of our relational work to deter you from the drive and mission you have for the students.

Implement a Cohesive Communications Plan: Our latest tech plan definitely introduced me to the art of "sales," which we incorporated into all of our communications. We consistently shared the benefits of our plan and what we would improve based on the research and needs assessment.

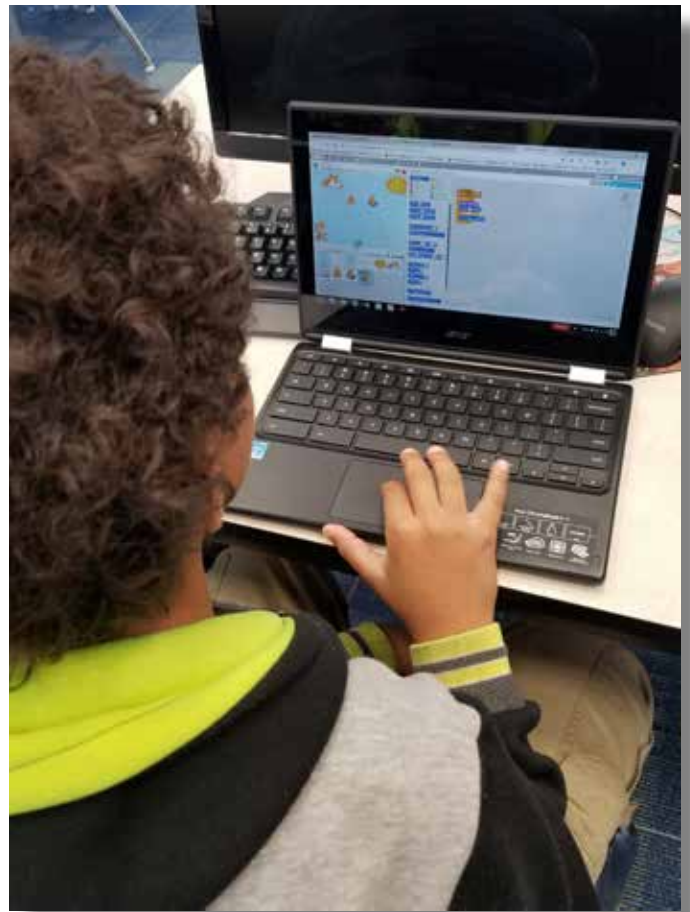
Your communications plan shouldn't stop once your project begins. Quite the contrary — take your communications efforts along the lifeline of the project to better capture and articulate your project's successes. Numbers and results will always matter to your constituents, investors, and to the strength of your strategy. Always point back to the needs and findings gathered to show how your team formulated profitable solutions.

These fundamentals steps have carried me through countless projects, from

IBM to serving as a Chief Information Officer. These steps have also helped shape and inspire the DCSD IT team to uncover more programs and methods to enhance existing educational technology offerings.

In addition to Digital Dreamers, which also included a 1:1 device roll-out for all middle and high school students and teachers, we've taken education beyond the limitations of a school building and further incorporated it into the lives of our students, parents, faculty, and staff through Artificial Intelligence and our virtual learning experience, FLEX Academy. We've also spearheaded the launch of the ed tech program IGNITEU, which assists in developing a strong technological foundation in support of our students' future.

Now it's your turn. We've all seen the numbers — 5 million U.S. families with school-aged children do not have Internet access at home, yet 70 percent of teachers assign homework that requires web access. This creates a "Homework Gap" that puts these students at a disadvantage academically. Now, the real question I pose to you is not "How did we get here?" But, "Are you ready to take the steps to foster equity in education?"





Gary Brantley is an innovative technology strategist known for his financial aptitude and expertise in cultivating productive collaborations.

Gary brings his more than 20 years of experience in the technology sector and 14 years of leaderships to his current position as the Chief Information Officer of the DeKalb County School District. He is the executive sponsor for digital process innovation and measures new efficiencies for maximized return on investment. In this role, Gary serves more than 118,000 end-users within the school district, which is ranked as the 26th largest school district in the United States and third largest in the state of Georgia.

In 2015, Gary was recognized as one of the “Top Thirty Technologist Trailblazers” by the Center of Digital Education and as a “40 Under 40 Emerging Leader” by the M&A Advisor. In 2016, Gary was appointed by the International Society for Technology in Education (ISTE®) to its 2017 board of directors. He serves on TAG-Ed’s Board of Directors and was recently named a Computerworld Premier 100 IT Leader. And most recently, Gary was awarded the “Making IT Happen” award by ISTE for his commitment to increasing digital learning opportunities for students.

Including U: Veterans in the college classroom / Part 1

by Dr. *Kata* Dosa

Postdoctoral scholar in the Center for Teaching and Learning at Georgia Tech.



Student veterans are a group with unique characteristics that deserve a voice in the discourse around inclusive teaching. Since the introduction of the “new GI Bill” (properly called the Post-9/11 Veterans Education Assistance Act of 2008) that provides significant financial benefits to those who serve, hundreds of thousands of active and former service members have enrolled in colleges across the United States (Barry et al. 2014, Sinski 2012).

According to Jeff Cullen from the Office of Government and Community Relations, currently 459 veterans are enrolled at Georgia Tech - about 1.5% of the total student population. While this ratio is lower at GT than many other institutions, it still means that in large classes, instructors will likely have a handful of student veterans in the audience.

What does it mean to be a veteran?

Vacchi (2012) defines student veterans as “any student who is a current or former member of the active duty military, the National Guard, or Reserves

regardless of deployment status, combat experience, legal veteran status, or GI Bill use". This definition will serve as the framework for exploring and understanding the experience of these students. If we closely examine the definition, we can see that the umbrella term "veteran" is used to describe numerous subgroups, foreshadowing the incredible diversity among veteran students.

When I set out to learn more about students veterans at GT, I was looking for a unified characteristic stemming from a common experience. It turns out, no such unified characteristic exists, because there is no common experience. Some vets have seen combat, some have not. Some got injured, some did not. Some are willing to talk about their experience, some are not. Veterans frown on the assumption that they are all alike, and with good reason. To expect veterans to be similar is akin to expecting people who have been through major surgery to somehow be alike. Being in the Armed Forces and having life-saving surgery are both significant, transformative life experiences that people process and make sense of in a multitude of ways.

In the following, I will draw on the perspectives of GT veterans and the literature, to identify some patterns among veterans as they relate to their academic success, followed by suggestions for

creating a learning environment that is designed to be welcoming to students whose lives were touched by the military.

How do veterans experience the college classroom?

Before we can understand how veterans experience the college classroom, we need a glimpse of what their life is or was like in service. The military is a highly structured and strict environment. The rules are clear: everyone has their assigned duties and responsibilities that they carry out following the standing operating procedures (SOPs). Discipline is pivotal, authority is absolute, and decisions can have life or death consequences. This environment is often in sharp contrast with the college experience, so much so that student vets often experience a form of culture shock (Zinger and Cohen 2010).

Andrew Hanus, a graduate student in Public Policy and City Planning, former Staff Sergeant of the Air Force, describes his transition: "The military, in a sense, has been easier. You have a lot more structure, you have expectations, duties you can't let up on. If you fail in class, you can re-test or take the class over, but if you fail in the military you can lose your job, rank, or even your life or that of a fellow soldier.

Being a student, sure, you have to get an A, but what's the pressure? Perhaps there is peer pressure or pressure from your family, but it's not nearly as much [as in the military]. Finding ways to fit in as a student has been troubling and a difficult balance, leading to procrastination with studies I have little interest

military is very different from the way we learn here at GT. In the military, you learn things on the job, non-stop, incrementally. Myself, I went through military law enforcement training; you have different blocks, they break things up, and it varies one week to the next.



in, and fear of losing my [military] identity.

The lack of structure can often be disorienting for student vets (Kirchner 2015). In the college environment students are expected to be agents of their own career, it is up to them what, how and how much they study. Tasks and assignments are also often broadly defined, to leave room for creativity, exploration and personal expression. Andrew also reveals that the process of learning in the military looks vastly different from what we are used to in academia: “The way we learn in the

For example, maybe you'd sit in class and learn about different statutes and different laws for one week. That's supplemented with hands-on activities, like how to handcuff somebody or how to write a ticket. And then you'll do field operations, things you can't learn in the classroom, and it keeps changing. You get certified at some point to show that you can handle the positions you are assigned at the base, but you never stop learning. Then you have career-specific trainings, so if you're gonna be an investigator, you're gonna go to this school for a while, or that for a few months or a few weeks. So the

training never stops. Here [at GT] you cram stuff in under 16 weeks and it is an immense amount of material you have to be fluent in for a quiz or paper.”

Veterans, thus, are enculturated to be life-long learners in the military. This is a quality that the current job market highly values: the capacity for life-long learning in context is among the top ten competencies sought after by employers, as predicted for the 2020 job market (WEF 2014). On the other hand, the current school system rewards students who can absorb and regurgitate vast amounts of often abstract “material” under short periods of time - something many veterans haven’t had to do in years.

It is not uncommon for service members to enlist straight out of high school and be on active duty for multiple years before leaving the Armed Forces. Andrew himself has been in the Air Force for nine years (six years active duty, then three years in the Air National Guard) before returning to a civilian school. This means that many veterans have not practiced “being a student” for many years. “I’m still trying to learn how to be a proper student.” - says Andrew, even though he has been in college for just over three years now.

A natural consequence of enlisting after high school is that the mean age for veterans in college is 33 years (Cole and Kim 2013) in four-year institutions, in comparison to the 22 years where traditional students average. The typical veteran, therefore, has about a decade on others sitting in the same classroom. This introduces both challenges and opportunities to the classroom dynamic. “I find it challenging when I get put in a classroom with students who are academically really bright but experientially they have no knowledge at all because they have never been in the workforce.



You get a lot of people who think they know how systems work in the world, like how our government systems work, but they haven't actually worked in that realm, so it's constantly frustrating because you have to listen to incorrect formulations all the time.” - bristles Andrew. His summary of the issue reverberates across the literature: veterans across the country find it difficult to think and work with much younger students, who not only lack the real world experience of veterans, but can often approach complex issues with naïveté and arrogance (Livingston 2009).

As a consequence of their years in service, many veterans approach life with a quiet humility, they don't take things for granted (Zinger and Cohen 2010) and they find it very frustrating when their student peers complain about minute things. “I find that I relate better to students who have taken a non-traditional route, not straight from high school to academia, who have maybe worked a few years, had some interruption.” - admits Andrew, highlighting some of the similarities between veterans and other non-traditional students.



Unfortunately, the age gap can sometimes prevent student vets from getting the help they need. David Ross, director of the Veterans' Resource Center at Georgia Tech, a veteran himself, describes this dynamic: "Veterans may not reach out to tutors. They are in their late 20s and 30s and these tutors are much younger. They don't want to go to talk to someone who is 18-19 years old." Especially for veterans who held high-ranking positions in the military, having to ask for help can be embarrassing, to begin with (Livingston 2009).

This is just compounded by the tutor's age, and additional generational and experiential differences. "I'm trying to create a group of advanced students and faculty that would be willing to step up and help in that capacity (as tutors to veterans)" - David continues. If you are interested in this opportunity, please reach out to him at david.ross@vpss.gatech.edu.



David Ross, Director of Veterans Resource Center at Georgia Tech.

Transitioning from the military world to civilian life is challenging for many students - and then we have yet to explore what it is like to be an active service member in college. Some students are sitting in our classrooms between deployments.

David describes what this is like: "Deployment back and forth - [one day you are] in a heightened situation, in war, in battle. Then you come back, and now you're sitting in the classroom again. Then you are in theater again" - he explains [being in theater: to be in an area where war operations are going on]. "We call it the cycle of deployment, to be going in theater and back. You are six months somewhere, and then you're back in a Wal-Mart, shopping for groceries.

This could happen multiple times during someone's time in school - I had a student who deployed twice during his program. Someone who is a veteran is done - they are out of the military. But if you're Guard or Reserve, you could be called in the middle of the semester. Then when they come back, they are trying to pick up the pieces, both administratively and psychologically."

Veterans' first-person accounts do more justice to describing the difficulty of transition than I can muster here,

(see Zinger and Cohen 2010). However, rooted in the same difficult, complex experience veterans bring to the classroom lies a beautiful yet often missed opportunity: learning from their experience.

Learning from veterans

Whatever their military path has been like, veterans bring a worldly, practical perspective few other students have. Many of them have been to other countries, they have seen things in context, and developed skills instructors can capitalize on in the classroom. “My buddy, he is a civil engineer [in the military] – so when he deploys, he is building stuff.” - says Andrew. Imagine having a student in an engineering classroom who has all this experience building and designing things in different corners of the world.

The nuance, the perspective, the applications they could share with others would undoubtedly enhance everyone’s learning.

- ***To be continued next month.***



Dr. Kata Dosa is a postdoctoral scholar in the Center for Teaching and Learning at Georgia Tech. She develops and facilitates programming and initiatives for faculty and graduate students, contributing to Georgia Tech’s pursuit of excellence in education.

Prior to her career at Georgia Tech, Kata earned her Ph.D. in Environment and Resources from the University of Wisconsin-Madison, where she conducted discipline-based education research in STEM. Kata’s current interests include teaching-as-research, the science of team science, creating inclusive learning environments and competency development in higher education.

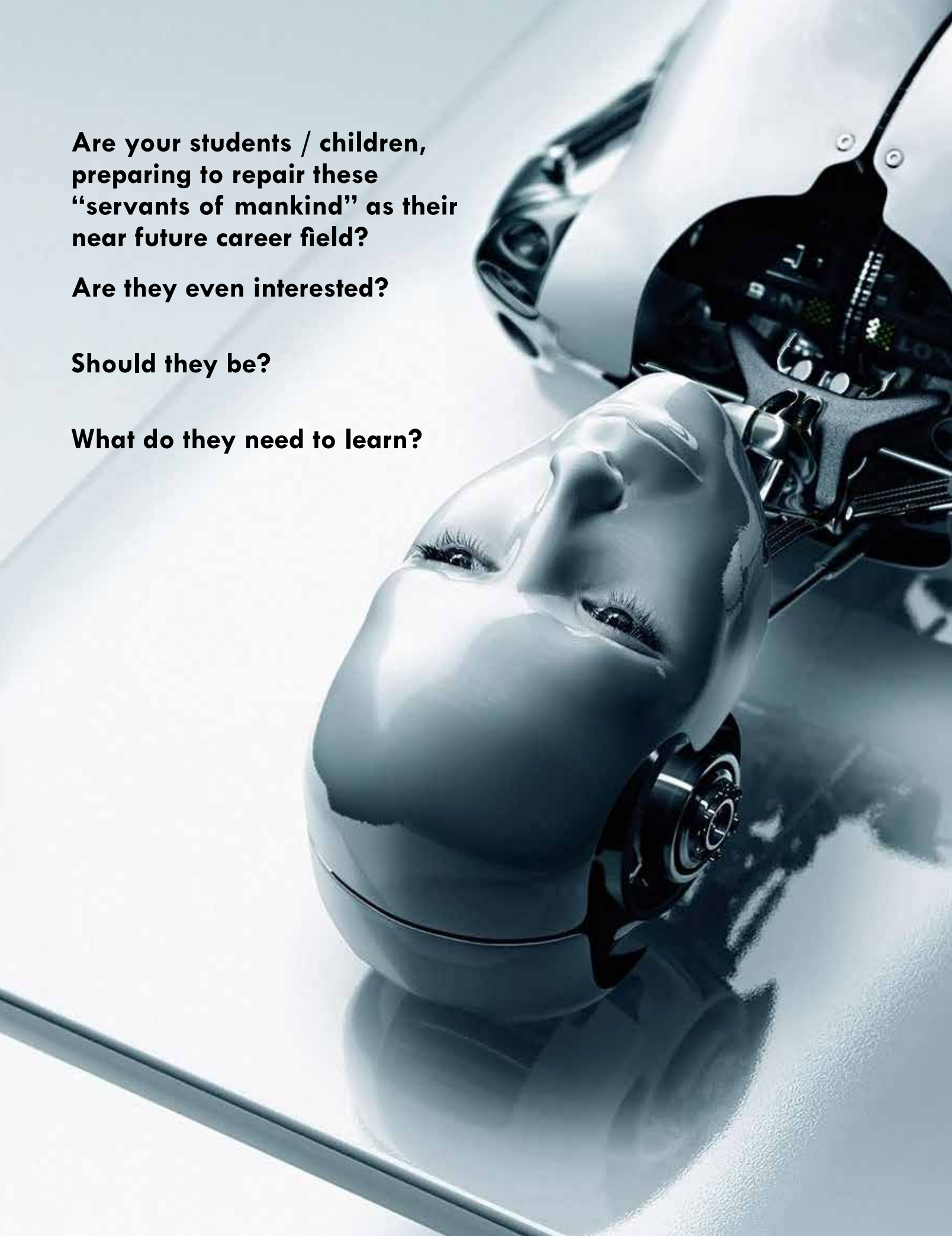
Be sure and visit the Georgia Tech Military Affinity Group (GT MAG) website:
[Click Here](#)

**Are your students / children,
preparing to repair these
“servants of mankind” as their
near future career field?**

Are they even interested?

Should they be?

What do they need to learn?



ROBOTICS IN THE K-5 CLASSROOM

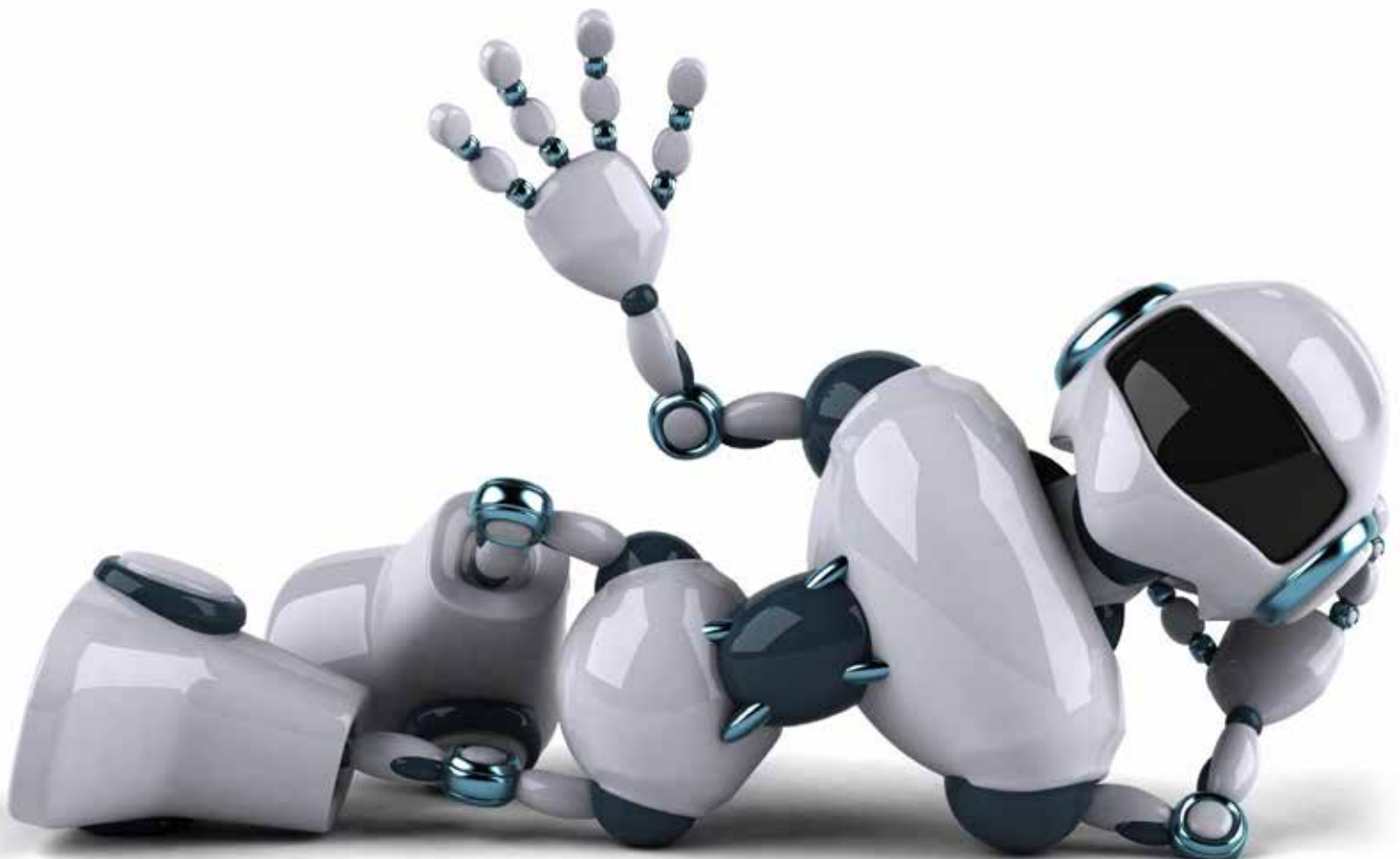
By *Stan* HICKORY

The world of automation

I recently had a conversation with someone outside of education. I asked him what he thought should change with our current education system and his reply was, “When I was in High School, most everyone took auto shop and learned to tear down and rebuild a car. Why don’t we do that with computers, robots, and networks - the fundamental technologies of our age?”

Why isn’t programming required like math?”

I walked into a McDonald’s the other day. There were seventeen people in line ahead of me. I was standing next to a touch-screen ordering kiosk and was intrigued by this new technology. How much faster could it be? I placed my order and watched. After the cashier had taken the fourth order, my breakfast was delivered to the counter. “That was fast, I thought. “How long will it be before everything behind that counter is automated?”



In an article in the Tampa Bay Business Journal, Hubertus Muehlhaeuser, CEO of Welbilt, was quoted, “I envision, within a year or two, people ordering their food by cell phone before they reach a restaurant. The order will go directly to the relevant appliance, which grabs the food, starts cooking it at the time dictated by the customer’s distance from the restaurant when they placed the order, and packages just in time when the customer arrives.”

A USA Today article reported on “Flippy,” a burger robot at Cali Burger in Pasadena, California. Flippy can cook 2000 burgers a day. According the Bureau of Labor Statistics, there are 3.4 million jobs in the food serving and preparation industry.

Consider Amazon Go. In 2017, Amazon opened its first cashier-less store in Seattle, Washington. A customer walks into the store, gathers the items she wants to purchase, and an app on her phone identifies and charges her for the items on her way out. According to the Bureau of Labor Statistics, that’s another 3.5 million jobs being replaced by automation. The Bureau has also calculated there are 3.5 million jobs in the trucking industry. These too will be lost to automation. That is over 10 million jobs that will be automated in the next five to seven years.

The top 10 most in demand jobs in 2010 did not exist in 2004 . In a 2016 report on the state of cybersecurity jobs by ISACA, there will be 6 million cybersecurity jobs and a global shortage of two million cybersecurity professionals by 2019 .

The call for robotics and programming in the primary years It is paramount that we add robotics and programming to the K-5 curriculum. It is common knowledge that teaching a foreign language in the primary grades yields a stronger understanding of languages in general. This can be applied to programming as well. “Learning programming has similarities to learning languages, because each programming language is a different language. So exposing children to the concepts that are similar across coding languages at a young age makes it much easier for them to learn and use these skills as they progress through life,” says Lindsay Craig, founder of Questbotics,



an educational robotics and programming company based in Longmont, Colorado. In addition, Mr. Craig explains that, “Technology is constantly evolving, introducing kids to the fundamentals at a young age means that they have a chance of keeping up with the advancements in the field as they grow older and start to use the tools of their chosen industry. And, advanced robotics is just plain difficult. If the skills are introduced at a young age as fun and approachable then students have a better chance of developing their abilities to reach the more difficult stages later in life.”

The interest in robotics at early ages is massive. I spoke with Dennis Kambietz, Director of Education at Robots Education. “We’ve demonstrated robotics to more than 12,000 students from grades 4-12, and we’ll average 90% of students wanting to learn robotics in middle school, and about 60% in high school, as compared to the national average of 2% for boys and .2% for girls. But most importantly, we’ve seen almost 100% interest at the primary level.” We need to feed this passion to address this dramatic drop in interest as students move from primary, to middle, and on to high school. This trend can be changed if we were to integrate robotics and programming into the K-5 curriculum.

Does this mean we are going to increase screen time for K-5 learners? Not necessarily. Questbotic’s, Lindsay Craig, has an approach to teaching robotics that starts without screen time. “At a young age I teach without using screens. That means using hands-on robots, physical activities and discussions...Working on a screen doesn’t nurture the soft skills that are so important in society and the workplace.

The real world also presents hurdles that are at the core of robotics. In a controlled environment, such as inside a screen, students don’t learn how to handle the problems that arise from trying to manipulate reality using robotics. Their goals, resources and methods are also limited to the system in which they are working. The real world puts no such limitations on problem solving and dream pursuing.”

How will Robotics and programming prepare our students?

Robotics and coding provide a vehicle for teaching perseverance, problem-solving, collaboration, critical thinking, and creativity. The very act of coding a robot is an exercise in problem-solving. How does one make a robot do a particular task? Students will go through a system of trial and error to program a robot.

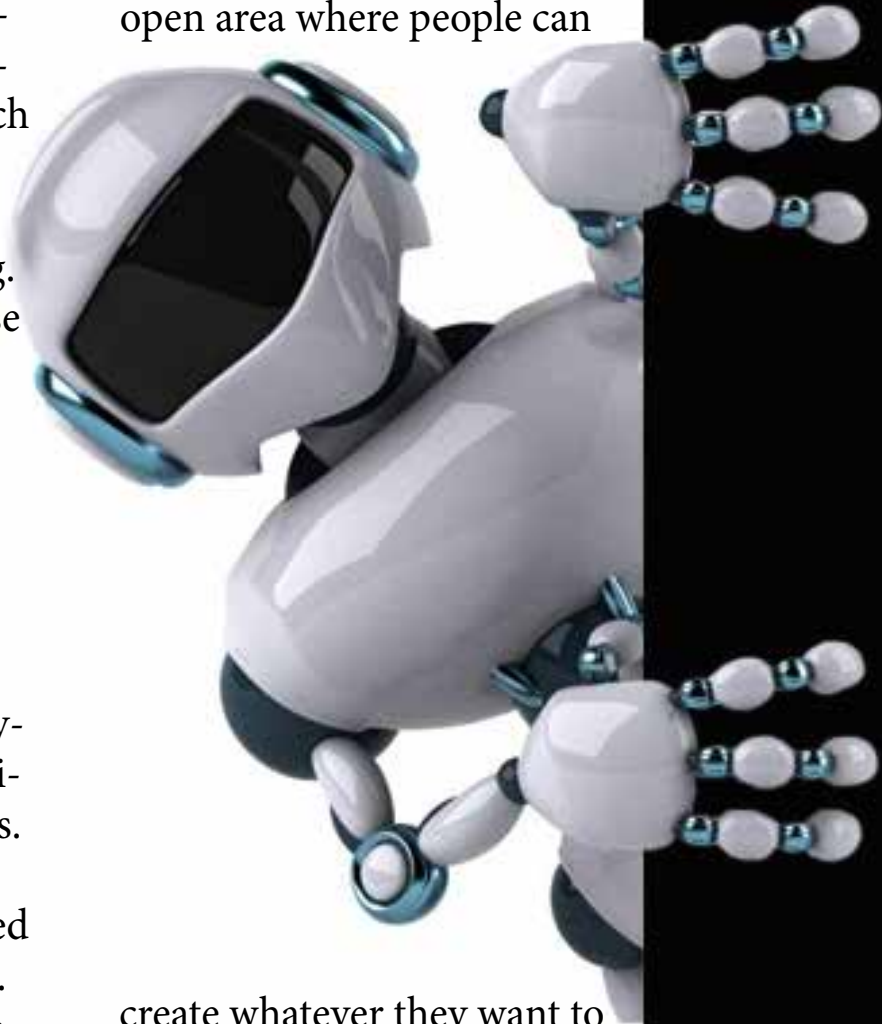
Unless the code is written perfectly, the robot will not move - and rarely is the code written correctly the first (or second) time around. This process also teaches perseverance and critical thinking. Finally, collaboration is a skill that will be developed as students work together to make the robot perform.

In a conversation with John Blankenship, founder and owner of RobotBasic, he expressed why we need to teach coding. "Programming is one of the best ways to teach problem solving, mathematics, and analytical thinking. Programming is motivational because it can be used to address realistic and interesting problems, especially through simulations. It is a valuable teaching tool because it provides instant feedback in many situations." I have seen this in action in one classroom that I observed. Students were tackling the difficult problem of bullying in our school by creating an application for kids to use to report bullies. They created a prototype and took it live with one classroom. This provided instant feedback on their application. They were able to use the feedback to improve the functionality of the application the very next day.

Our students will be going into what is called a "Gig" economy. This means most jobs are short term contracts and

the most successful people will be able to identify problems for a businesses and then provide the solutions.

Steven Reinharz, President of Robotics Assistance Devices, in Orange County, California, says, "Robotics is an open area where people can



create whatever they want to solve whatever problems they see. . . it's about creativity."

I know of one school where students are using programming to do this. They were

unhappy with the number of choices on the school's lunch menu and the amount of food being thrown out each day. Students created an application to manage pre-ordering of meals so the cafeteria knows exactly how many lunches to prepare.

This type of problem-identification and problem solving enhances the skills necessary for our students to be successful in the rapidly changing job market. Soon, we will walk into a McDonald's and see an entirely automated system; from taking an order, to flipping the burger, to getting it into the customer's hands. But, there is still the need for people identify problems and build robots and program software to solve programs. The sooner teachers can introduce this technology the better off our students will be. The key is to understand that robotics and programming does not have to be a separate, stand-alone class.

Rather, it can be used to enhance learning and problem solving in all areas of the curriculum. There are countless companies popping up that provide robotics hardware, software, curriculum, and professional development. If you would like more information on how to get robotics into the classroom, you can contact me at www.linkedin.com/in/stanhickory.

Margie Maning, "Here's what the next generation of the fast-food industry looks like to this Tampa Bay CEO", <https://goo.gl/zVhbej>, (May9, 2018).

Bureau of Labor and Statistics, <https://goo.gl/6HN3of> (accessed June 1, 2018).

"We are living in Exponential Times", Ivy College, <https://goo.gl/8ZhK4K> (accessed June 1, 2018).

Steve Morgan, The Cybersecurity Jobs Report: 2017 Edition, <https://goo.gl/oJpkyg> (May, 31, 2017).



Stan Hickory has been in education for over 20 years. Stan worked in the K-12 system as a Social Studies, English, Design Thinking, Environmental and Spatial Technology teacher. Stan has also been the Executive Director of the non-profit, Trek To Learn, a educational travel organization. Currently, Stan is working as an Administrative TOSA as an Assistant Director at Achieve Academy, a K-8 school in the Mapleton School District. Mapleton is a small district just north of the Metro Denver area. Stan lives in Boulder Colorado with his wife and three daughters.

Not designed for just STEM teachers.

No matter what you teach, from basketball to physics, this magazine is for you and your students.



Review and use the resources. Stimulate your own creativity.

Forward it to your students and their parents...unlimited.
Make this a new connection for curiosity and interaction.

Every subject uses STEM skills.

Submit an article: wayne@stemmagazine.com



Hope and Opportunity to Under-served Youth through Technology Education and International Exposure.

During the first week of April 2018, a beautiful and powerful transfer of knowledge happened as four students from Atlanta, Georgia, facilitated a coding workshop for under-served students in Ciudad Sandino, Nicaragua. This one-week workshop is called the HYPER International Experience, and is the signature program of Hope for Youth, Inc.

Hope for Youth through emPowerment and Education – more fondly called HYPER – was established in September 2017. The mission of HYPER is to offer experiences and opportunities that empower youth to live lives full of hope, driven by love, and void of fear. Our youth should not be inherently limited due to economic status or social standing. By incorporating mentorship, tech education, and international exposure, HYPER programs tackle the issues of diversity in STEM and exposure to technology career pathways for minority and low-income youth.



Kristina Smith

The first cohort to complete the HYPER International Experience was comprised of four young women, ages 17 and 18. For 4 months leading up to this Spring Break experience, our HYPER crew was introduced to fundamental

coding concepts and learned front-end web development. They also learned teaching methods, created learning activities, and developed the web site used to host the entire week's content online. After all of the dedication and hard work, these young women applied their newfound coding knowledge and served as teaching instructors for eighteen 7th and 8th grade students at the LifeLink School in a small city located outside of Managua, Nicaragua, the country's capital.

The HYPE International Experience is a project that emerged from my own experience growing up with no exposure to coding.



I got lucky and happened upon choosing a career path in technology during college, but I know this is not the case for everyone. Hope for Youth was created specifically for marginalized, under-served, and underrepresented students like myself. We want to expose students to the success that a STEM career can offer and increase the likeli-

hood that they pursue STEM degrees in college. As support for HYPE grows we'd like to expand this program to other parts of the state. Reaching students in other areas that could benefit from a similar exposure and experience.

Having worked as a technology consultant and engineer for nearly 7 years with several large corporations, I saw firsthand the lack of diversity within the technology sector. I experienced firsthand the impact of what not having mentorship can have on someone trying to be successful in unfamiliar territory. I became motivated to both encourage and influence more young people to enter the technology sector.

Why teach others? Hope for Youth desires to connect with students on a personal and relational level. Marian Wright Edelman said, 'You can't be what you can't see'. I want to lead by example and help HYPE participants see something more. However, teaching wasn't chosen simply to share knowledge; it was chosen to help HYPE participants retain what they've learned and grow in confidence of what they can accomplish. The Learning Pyramid, developed in the 1960s by the NTL Institute, shows us that on average, we retain 90% of what we teach others.

HYPE intentionally curates learning environments that encourage and empower participants to teach others, being positioned to make mistakes and learn from them in safe spaces. Why travel? The capacity to dream is enhanced by travel and exposure. With this program, I have linked my background in technology with my passion for travel to help young students.

If what student experiences in their reality becomes bigger, better, and brighter, imagine the impact it can have on their dreams. Three of the four participants of the pilot experience never traveled abroad. Half of them had never been on a plane. With minimal exposure to computing and little to no context of a world beyond their 10-mile radius, the HYPE International Experience brings about an amazing transformation of thought and trajectory.

The model has both local and global benefits. For the local students turned teachers, they are deepening their skills, expanding their network and relationships, building confidence, and participating in meaningful experiences that can be highlighted in college applications, resumes, and scholarship essays but also gives back to the global community.

For the international students, they are being exposed to things that they didn't even know existed! They live in



a world where technology is not as easily accessible or at their fingertips. The students we teach won't wake up after a one-week coding camp as engineers or computer scientists, but they might wake up believing they can be some day. And this is the power of exposure.

After a successful implementation of the inaugural HYPE International Experience, Hope for Youth is working to expand its reach and offerings. For the 2018-2019 school year, we plan to bring on 20 new HYPE Crew members. We are also working with a children's home in Jamaica to facilitate the 2019 HYPE International Experience in Montego Bay.

Participation in the HYPE Program and the HYPE International Experience is completely free for students involved.



To learn more about HYPE and/or support future cohorts, visit gethype.org. Hope for Youth is a 501(c)3 non-profit organization.

Kristina Smith Bio.

Kristina Smith is a passionate & driven STEM advocate committed to serving youth by preparing them for a successful future through STEM related exposure, opportunities, and careers. She graduated from Prairie View A&M University with a degree in Computer Engineering and started her career as a technology consultant with consulting firms, Accenture and Slalom.

As a nonprofit professional, Kristina has worked with organizations such Girls Who Code, Technology Association of Georgia Education Collaborative, WrightNow Solutions, Atlanta Bridge Community founded by Coca-



Cola, and TechBridge directing programs, facilitating coding camps, training employees, and coordinating partnership efforts. In 2017, Kristina branched out into entrepreneurship with the launch of a nonprofit called Hope for Youth, Inc.



DR *Judy* WILLIS
NEUROLOGIST

HOW TO REWIRE YOUR **Burned Out** BRAIN: *Tips from a Neurologist*

"For teachers and students."

Editors comment:

We ran this article a few years ago with strong reactions from educators who struggle to stay in education. Since summer is here, we thought it a good idea to run once more as "burn out" rages in epic proportions across global education at all levels.

The school year will be over before you know it, and with it comes a likely drop in the stressors that build up and promote teacher (and student) burnout. It therefore may not seem timely to suggest interventions to prevent or reduce burnout. However, it is often not until we are away from a high-stress situation for a while that the brain can move out of reactive survival mode and into a relaxed state where it can ponder the big picture.

The burnout interventions I am about to suggest are likely to be ones that you already know. The problem is, when it comes to adding another activity to your schedule, past experiences may have left you with the expectation that there is not enough time -- or you've tried things like this before and didn't notice any change.

So you stopped.

My belief is that when you understand what happened in your brain to build up the hopelessness and frustration of burnout, you'll connect with the logic of the interventions. Then, with the addition of the video game model to the boost the neurochemical benefits of the activity of your choice, you'll literally de-construct the resistance network your brain constructed, and reset your circuits of confidence and motivation.

Know It's Not Your Fault

Teachers often blame themselves for problematic student behavior, failure to "cover" every standard, and not differentiating instruction to suit the needs of each student. Know that you are not alone, but part of a growing majority of educators questioning their abilities to continue teaching. You are teaching at a time when it takes profound commitment and creativity to meet expectations. There is pressure to teach excessive quantities of information and differentiate instruction to meet the needs of all students -- yet the supporting resources needed are dwindling.

Burnout feelings are not a reflection of your teaching skills. Teachers who question their ability to do their jobs properly are often among those who hold themselves to the highest standards. They also put in the greatest

effort. When they must deal with external forces -- beyond their control -- *that limit their ability to attain their goals, self-doubt builds, confidence drops and burnout sets in.*

If You're Burned Out, Your Brain Has Rewired to -

Survival Mode



What I offer from the nexus of my dual careers as a neurologist and classroom teacher are interpretations and correlations from the neuroscience research to teaching and learning. Neuroimaging studies reveal the metabolic changes in regions of the brain where activity increases or decreases in response to emotional or sensory input.

There are specific and reproducible patterns of changing neural activity and brain structures associated with stress. In the high-stress state, subject's

Reset Your Brain's Default Neural Network from Retreat to IGNITE!

scans reveal less activity in the higher, reflective brain and more activity in the lower, reactive brain that directs involuntary behaviors and emotional responses.

Prolonged stress correlates with structural increases in the density and speed of the neuron-to-neuron connections in the emotion-driven reactive networks of the lower brain, and corresponding decreased connections in prefrontal cortex conscious control centers.

The explanation of these changes is generally attributed to the brain's neuroplasticity of "neurons that fire together, wire together." The brain literally rewires to be more efficient in conducting information through the circuits that are most frequently activated. As you internalize your thwarted efforts to achieve your goals and interpret them as personal failure, your self-doubt and stress activate and strengthen your brain's involuntary, reactive neural networks. As these circuits become the automatic go-to networks, the brain is less successful in problem-solving and emotional control.

When problems arise that previously would have been evaluated by the higher brain's reasoning, the dominant networks in the lower brain usurps control.

The good news is that you can apply what you now understand about your brain's survival mode to take back voluntary control of your choices. You can activate the same neuroplasticity that gave dominance to the lower brain networks in the burnout state to construct a new, stronger default response. With more successful experiences achieving goals, you can reset the circuits that will direct your brain to access its highest cognitive resources for creative problem-solving. You can build up new, improved circuitry, switching your responses from retreat to IGNITE!

Since a repeated pattern of effort-failure set up the brain's survival response to withhold effort, you'll need to strengthen the pattern of effort toward goals can result in success. Your weapon of mass reconstruction can come from your brain's very powerful drive for its own neurochemistry -- dopamine and the pleasure it brings.

The plan to guide you comes from the video game model that works because of three components: buy-in, achievable challenges, and frequent awareness of incremental progress en route to the

final goal.

See these resources for a full description of the video game model:

- *A Neurologist Makes the Case for the Video Game Model as a Learning Tool*
- *How to Plan Instruction Using the Video Game Model*

The fuel that motivates the brain to persevere through increasing challenge, even through failed attempts, is dopamine. This neurochemical produces the pleasure of intrinsic satisfaction, and increases motivation, curiosity, perseverance and memory. Dopamine is released when the brain makes a prediction or achieves a challenge and gets the feedback that it was correct. This can be in situations from the “Ah, I get it!” of figuring out a joke to the satisfaction of completing a marathon.

Just as the video game model can be applied to building a growth mindset in students, the same model can help rewire your mindset regarding your ability to achieve teaching goals at school. As in the video game model, to get the dopamine-pleasure response from challenges achieved, you’ll need to plan for your brain to experience frequent recognition feedback of incremental progress.

You should set your “rewiring” goals by their desirability and by the goals’ suitability to be broken down into clear segments.

This way, you can chart your goal progress as you achieve each stepwise challenge. The pleasure burst of intrinsic motivation that will accompany your recognition of each progressive increment achieved in the goal pathway will keep your brain motivated to persevere.

Goal Buy-In for Your Brain’s Neural REWIRING

Buy-in and relevance are important in choosing your rewiring goal. Since your goal is to rewire your brain’s expectations that your efforts will yield progress, even through increasing challenge, you need to really want the goal. This is not the time to challenge yourself with something you feel you should do but won’t really look forward to doing, such as dieting, climbing stadium stairs, or flossing after every meal. Select a goal that you would enjoy en route and at the finish.

Usually goals are tangible. Some are visible, such as planting a garden or making pottery on a wheel. Others are auditory, such as playing an instrument, or physical, such as learning tai chi.



But your goal can also be the increased amount of time you sustain an activity such as journaling, practicing yoga or sketching.

Sample “Rewiring” Goals

You’ll find your own goal for buy-in, but here are some examples to give you a sense for how to structure your new goals.

Physical Goals

Notice I didn’t say exercise. That’s not as motivating as “training” for a physical goal you want to achieve, even though they often overlap. If you want to run a 10K, and if you enjoy running, the goal for achievable challenge could be first building up to the distance starting with the baseline distance you comfortably run now. Then plot out the increments that you’ll consider progressive successes, such as adding 5K a day or a week.

The increments will depend on what you consider both challenging and achievable. Once you reach 10K, speed can become the next goal, again plotted out in segments of incremental progress before you start.

Archery?

Possibly after seeing The Hunger Games, archery has new appeal. Again, plan your stepwise achievable challenge increments. Start with a home dartboard (a low initial investment) and throw from a close but challenging distance. As you get better in accuracy, move farther back. Record your results, noting the distance of each improvement you set as an achievable challenge. If you get so good that the dartboard no longer challenges you, try that archery!

Learn a Language

But try this one only if the buy-in is strong enough, such as definite plans to go to a country where the language is spoken.

Videography / Photography

If it appeals to you to make high quality videos or PowerPoints using advanced computer software, go for an early success, such as the videos you can make on www.animoto.com.

Repeated effort-reward experiences promote neuroplasticity, and this makes a neural network that expects positive outcomes into your new default network. This is because your “rewiring” goals helped your brain build stronger and more connections into a memory pattern where effort brings pleasure.

As with other networks not used, the previous lower brain stress-activated go-to response network you developed, the one that caused you to react to problems, will be pruned away from disuse.

You’ll be rewired with optimism and renew your positive expectations. With your higher, reflective brain back in control, you’ll be able to access your perseverance, innovation and creative problem-solving when you return to the classroom. Just be sure you take time to recognize each small success and creative problem-solving opportunity.

Keep up the habit of breaking down big challenges into opportunities for recognizing incremental progress and receiving your well-deserved dopamine reward. The brain needs that battery recharge to sustain the positive expectations that motivate continued effort -- so that you can stay engaged and move to the next step toward your teaching goals.

*Your Rewired Brain’s Default Changes from Defeat to **Ignite***

Dr. Judy Willis is an authority on brain research regarding learning and the brain.

To understand **STEM...**

...you must DEFINE STEM, but you cannot define an acronym using the words it stands for; you must define the words the acronym stands for.

Universities and organizations around the world continue to debate what a STEM career is. There is no doubt that “every career” uses STEM skills and this observation remains the focus of STEM Magazine.

Science: “The systematic accumulation of knowledge” (all subjects and careers)

Technology: “The practical application of science” (all subjects and careers)

Engineering: “The engineering method: a step by step process of solving problems and making decisions” (every subject and career)

Math: “The science of numbers and their operations, interrelations, combinations, generalizations, and abstractions” (every career will use some form[s])

For a moment, set aside any preconceived notions of what you think a STEM career is and use the above dictionary definitions to determine the skills used in any career field you choose.

These definitions are the “real” meaning of STEM skills and STEM careers.

STEM *Integration* into your class today and everyday.

by *Wayne* Carley

“My class is not a STEM class. I’m an English teacher.”

If I may, let me gently correct you. Yes, you are a STEM teacher as you are using, expecting and encouraging **STEM skills** with every assignment, lecture and test.

As a reminder, **science** is the “systematic accumulation of knowledge” and is absolutely necessary for any term paper, history lesson or learning evaluation. So, there is the “S” in STEM. The use of Google, online libraries, computer and software use, all of which are a daily part of your class and homework assignments is obviously the “T” for technology. They are only “users” of the technology rather than innovators, but still attached to the “T”.

“E” for engineering is the use of the engineering method (a decision making process) that make a term paper or other writing assignment impossible to accomplish without. Simple decisions about how to organize and prioritize content is a perfect example of that method. We use it 10 times a day if not more, and English class is not exception.

Math, the “M” of STEM is also used to a lesser degree perhaps, but used non the less. From a simple “word count” calculation, which happens to tie in closely to the engineering method of decisions, to statistics, dates, time spans and more, some level of basic math is included.

Here we have shown how STEM skills are a regular part of the typical English class. The question remains, is the English teacher even aware of this. I’ll stick my neck out and suggest “no”, not for most. Why not?



It may be a simple lack of awareness, which happens to be a primary objective of STEM Magazine. *“But why should I really care?”*

Students NEED to see the practical connection between what is being taught and why they need to learn that information. Name one career that does not require some form of written communication daily, either from filling out forms or sending E-mails to clients or preparing written presentations to acquire new customers or clients?

The skill set needed is not just creative writing, but the *complete set* of STEM skills and more importantly, the knowledge that they are using them.

Aside from your curriculum, this too is your responsibility to adequately prepare your student to enter the work force.

Here is your “Verbal Integration” opportunity and it only takes about *30 seconds*.

- Bring to the attention of your students that they are using a type of *science* to do their assignment (*the systematic accumulation of knowledge*).

Now they begin to make a conscience connection between the assignment and the “S” in STEM. The journey begins. If you have another 30 seconds, ask someone to name any job that requires writing something regularly.

This simple and “non-curriculum” type of integration and awareness has value far beyond our understanding, both for the educator, student and parent.

You’re smart enough to make these types of connections in your subject field so I’ll end the article here, but our responsibility as educators to prepare our students goes well beyond our specific subject field and this type of easy integration should not be a burden to any of us. Fact is, it can be fun and potentially improve the performance of students as they make these connections early in their scholastic development.



Rome

Atlanta

Athens

STEM is Georgia Wide

Columbus

Macon

Savannah

Albany

Brunswick

Valdosta