

April 2019

GEORGIA PATHWAYS

M A G A Z I N E

Empowering Women
In STEM

STRAND BEEST'S

STE(A)M TRUCK

Introduction to Digital Technology

CAPACiTY Summer Professional Development



CULTURALLY AUTHENTIC PRACTICE TO
ADVANCE COMPUTATIONAL THINKING IN YOUTH

CAPACiTY is a new curriculum for the Introduction to Digital Technology (IDT) course, developed by Georgia Tech with funding from the National Science Foundation, that enables students to develop digital technology and programming skills as they research and design solutions for a problem of their choice. (See reverse side for details of the course curriculum.)

Come learn how to implement CAPACiTY in your classroom!

WHAT:

40 total hours of professional development

- 10 hours online prior to course
- 30 hours face-to-face on GT's campus

WHEN:

- **Online:** 10 hours between June 3rd – July 21st
- **In Person:** July 22-26, 2019*, 9 a.m. – 3:30 p.m.

WHERE: Georgia Tech

*Lunch Included

COMPENSATION:

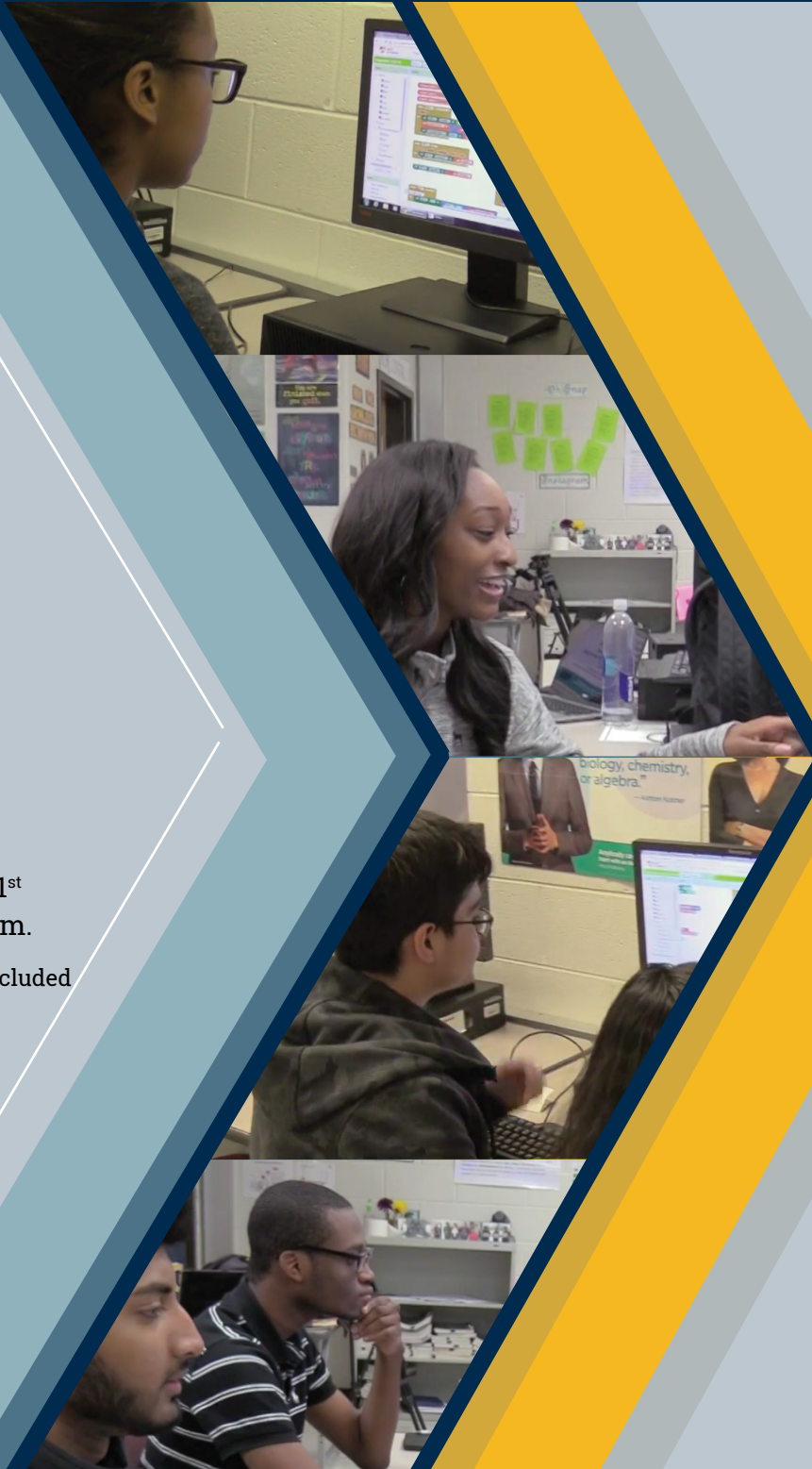
Teachers receive **\$800 stipend** for course completion

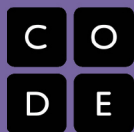
TO APPLY

Send Email Inquiry to Capacity@gatech.edu

Include name, school, and school district.

SPACE LIMITED





Bring Computer Science To Your School with Code.org

Why Computer Science?

Computer Science is foundational to a liberal arts education for **all** careers.

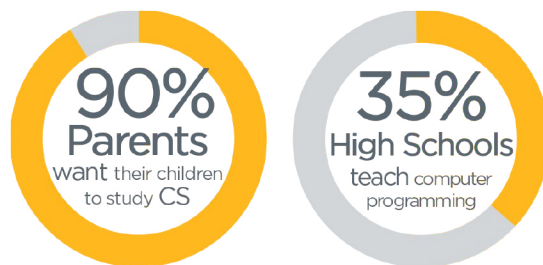
Students love it!

- Students rank CS as their third favorite subject behind the arts.
- CS has climbed to the 4th most popular STEM major for college-bound students

CS Opens up Future Opportunities

- CS teaches critical thinking and problem solving, fostering collaboration, curiosity and creativity - skills that all employers seek.
- Computing jobs are the best-paying, fastest-growing, largest sector of new wages.

Parents want their children to learn CS



Over 90% of parents also consider CS equally or more important than math, reading, science, history or other academic subjects

A Complete CS Solution Supported by Local Organizations

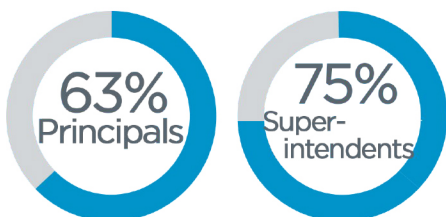


“Code.org is a one-stop shop for coding in schools.

Most importantly, teachers don't need computer science degrees to facilitate the coursework.”

-Common Sense Education

The Need for Teachers



report having no teachers with the necessary skills to teach CS in their school or district.

A Complete, Proven Program

Code.org provides a complete CS program combining open source K-12 curriculum with professional learning, which consistently gets high ratings from teachers.

No Need to Hire

There is no need to hire specialists to teach CS. Our program is uniquely designed to support teachers new to CS while offering the flexibility to evolve lessons to fit student needs.

Local Knowledge, Support

Work with a local Code.org partner organization that understands your needs and community to bring CS to your school.

Effective in Diverse Districts

The Code.org program has been proven effective in major urban school districts such as L.A. and Dallas to small rural districts in Iowa. It is the leading K-12 CS curriculum in the U.S.

Learn more about Code.org's Professional Development program at code.org/apply or Nominate a teacher to attend the program at no cost code.org/nominate

Content Request

Georgia Pathways™ requests the privilege of including your content or the content of your students in our 2019 issues.

This is a great opportunity for students to be published and for educators and industry professionals to share their insights and wisdom regarding careers nation-wide.

If you have questions, please contact the publisher at:

wayne@stemmagazine.com

Content submissions:

- Word.doc format
- Art and Images as attachments
- 300 dpi resolution
- **Completely** revised and spell checked.
- Unlimited electronic distribution to your school audience.

Advertising:

- Full page ads are available monthly at a very low cost.

Distribution:

- 181 school districts, state wide, monthly, as well as Georgia industry and private sectors.

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



Earlier this year, Forbes magazine released a report on the emerging STEM education trends that would be most important for 2019. They reveal many developments that hold great promise, not just for STEM education, but for our workforce and economy.

The report showed that STEM education initiatives would have a positive impact on the perception of teachers and the teaching profession. In a time when slim budgets and a variety of negative issues can plague the average school system and its educators, the report revealed that STEM education has provided an overall public image boost.

Students, educators and parents are excited about the new emphasis being placed on core curriculum's that are innovative, inclusive and lead to promising career paths in technology.

Likewise, the report showed that STEM education efforts and interests are providing a kind of halo effect, prompting schools to examine the school day environment and placing refreshed emphasis on building classrooms where students and teachers can thrive.

It is also abundantly clear that building a stronger STEM workforce is an imperative. STEM jobs yield higher paychecks and STEM skills are vital for our current and future workforce, the report noted. STEM education is now directly linked to the strength and success of our workforce and economy as a whole. TAG invests in producing this publication to foster and encourage STEM education efforts.

Inside this edition you will find perspectives, data, information and stories that are designed to inspire and help you in the pursuit of all things STEM.

I hope you will find just what you are looking for among these pages. 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

EXECUTIVE DIRECTOR/EDITOR
Errika Moore

PUBLISHER
Wayne Carley

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



STEAM TRUCK
Jason Martin

Empowering Women / STEM
Maya Chande

STRAND BEEST'S
Publisher

The Foundation...NOT KEY
Sol Rosenbaum



From the Executive Director

Congratulations Georgia!!! We've proven yet again that putting our students first and preparing them for "what's next" is priority #1. Two exciting developments occurred during last month that will have a tremendous impact on the future of all students in the state of Georgia.

Thanks to the thought leadership and due diligence from the Department of Education's Computer Science leads Deputy Superintendent Dr. Caitlin Dooley and Bryan Cox new computer science standards were created for grades K – 8 that align and progress to grades 9 – 12. As a result the state board of education approved the additional standards that are available as early as the 2019-20 school year.

According to Code.org "Computing is a fundamental part of daily life, commerce, and just about every occupation in our modern economy. It is essential that students are exposed to the field of computer science in our K-12 system—as it is foundational in transforming the way a student thinks about

the world. It not only teaches them about technology, it also teaches them how to think differently about any problem. Computer science puts students on the path toward some of the highest paying, fastest growing jobs in America."

And as such they recommend nine policy ideas to "build and sustain a comprehensive policy framework that supports broadening the teaching and learning of computer science. They support a vision built on five principles: Equity and Diversity, Clarity, Capacity, Leadership, and Sustainability."

[Click here](#) to learn more about the nine recommendations. As Georgia continues to shine as a leading champion for STEM, at TAG-Ed we're excited to know that Georgia has currently achieved seven of the nine recommendations. And thanks to the collaborative efforts of several organizations represented on the CS4GA policy committee, SB 108 passed the General Assembly this legislative season and is currently awaiting the Governor's signature. This proactive legislation requires computer science courses in both middle school and high school.

Again, we know that computer science content in our classrooms encourages not only computational thinking, but sequential thinking, curiosity, logic and philosophy skills. So we're truly excited that Georgia is leading the way and leading the charge to make a difference in the lives of students.

Sincerely,

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

Executive Director
TAG Education Collaborative

STE(A)M

by Jason Martin



Jason Martin

TRUCK

Most Atlantans would think twice before handing a hammer to a kid in a park with the suggestion, “go play!” Yet, this is exactly what some parks are doing in Great Britain and increasingly here in the US. The belief that risk, authenticity and play go hand in hand is something most older grandparents might muse to the younger generation, entreating them with “in my day, and with nothing more than a stick and tire, we had FUN, none of those play-station shenanigans!”

I believe the rise of the Maker Movement and STEM education have spurred similar conversations about classroom instruction. Teachers, policy makers, education reformers and philanthropists are increasingly discussing ways to embed play and authentic learning experiences into the classroom as an effective, if not essential, practice to ensure kids are ready to thrive in the real world.

Closer to home, we are starting to take early steps in this direction, as evidenced by the recent passage of the recess law passed in Georgia, which I view as a small step toward a holistic approach to learning needed to ensure kids are ready to thrive in the real world.

I began typing this article while waiting with my family for our plane to London to take off. My kids, needless to say, were more excited about seeing Platform 9 3/4 than Windsor Castle, but now in our second day of vacation and after spending a couple hours in Hyde Park, they're as excited about a playground as seeing Harry Potter.

Under a bright, sunny sky we visited the Princess Diana Memorial Playground. Considered by many as one of the best kids' parks in the world, we were excited to visit and immediately saw what all the fuss was about; kids were having a blast swinging on the

lines of a wooden pirate ship, knocking each other over on a suspended rope bridge, and, my favorite, finding a hidden section of the fence that lifted up with just enough room for a small kid to enter a secret garden. I wished I could squeeze in, but knew that not allowing adults was probably intentional.

If I could imagine the best part, it was getting out of the secret garden. Kids had to climb up a real tree, walk down a long limb that was perched over the fence, and then jump down five feet before running off to more adventure. I could easily identify the American tourist parents, wide eyed with hands



reaching up to catch their kids before even hearing them shout, “don’t fall!” or “go back!” And to be perfectly honest, that was my first inclination as I imagined my kid falling and getting hurt. It made me realize how hard it is to practice what I preach.

As the founder and executive director of Community Guilds and our STE(A)M Truck program, I created a mechanism that allows local experts to teach inside schools (or outside in their parking lots) using real tools and technologies.

On social media you can see even the youngest kids we serve using real hammers, and by 3rd grade kids can build with bandsaws, laser cutters or 3D printers. We intentionally introduce kids to tools that are not often used inside public schools because, we believe, agency and autonomy are naturally embedded when kids use real tools. And much like what happens in the playground mentioned above, we allow kids an opportunity to learn outside the proverbial “box.”

However, since our work happens inside and during the school day, this approach is about transforming the classroom experience by shifting the mindsets and expanding the skill sets of teachers to change what is possible from within the four walls of a classroom.

Most readers should question if external programs can make systemic changes in public schools. The short answer is, “no,” probably not, at least not in isolation. Anyone who has spent a career in educational reform, or has even just stepped inside an under-performing school, rightly believes there’s no silver bullet. But I sense a growing movement and shift in beliefs. If we can harness true problem-based learning as a natural component of STEM education, and ensure the creativity and innovation that the Arts provide, while instilling competency-based evaluations advocated by maker movement practitioners, we can embed agency and authenticity into the classroom.

Of course, everything I mentioned above is not new. Just ask your grandparents how they learned the real skills they used throughout their lives or how parents in Great Britain advocate having their kids take a leap off a high branch. I can easily imagine public schools taking the best parts of the past to shape an educational experience that prepares youth for the future.

In the meantime, I’m looking forward to playing in more parks with my kids.
Pass me a hammer!

Jason Martin is the Executive Director of Community Guilds and its STE(A)M Truck program. STE(A)M Truck was recently selected by Learn4Life as a 'Bright Spot' in 8th grade mathematics for its strong results in supporting school culture and teacher effectiveness, and providing interventions for struggling learners. If you'd like to help scale this incredible work, you can join the 8th grade math network [here](#).



Empowering Women in STEM

by Maya Chande



"I just don't think you're cut out for it."

"You're not smart enough."

"Science is for men."

"No."

These words fill the ears of countless girls across America and around the world. These words squander talent; they extinguish passion; they crush dreams. These words should never burden the heart of any female or person.

This is the mission of the Georgia Association of Women in Science. Advancing the vision of the global Association of Women in Science, the Georgia Association of Women in Science "supports and empowers women in all fields of science, technology, engineering, and mathematics (STEM) in any employment sector." They exist to provide career and development opportunities to females of any race, socioeconomic status, or age.

The president of Georgia AWIS speaks of gender discrimination from personal experience. Growing up in rural North Alabama, Dr. Kathryn Oliver had impressed on her the notion that "women must find a husband, settle down, and raise children."

Science was a far cry from what women were expected to pursue in that society, but Dr. Oliver refused to abide by such antiquated standards. Realizing her profound passion for STEM fields through courses in high school, she decided to pursue science into college, acquiring a PhD in Genetics, Genomics, & Bioinformatics from University of Alabama at Birmingham despite the suggestion of her college academic advisor to “switch [her] major to something like English or History.”

She now serves as part of the Emory University Center for Cystic Fibrosis and Airways Disease Research (CF-AIR) and has won numerous awards for her work. Dr. Oliver’s journey represents what AWIS strives to do: transcend boundaries.

Providing equal opportunities for women in their education and careers has been a difficult pursuit for the scientific community for decades, and Dr. Oliver believes that “the solution is not likely to arise from one answer.” Thus, AWIS GA strives to achieve a myriad of goals to bridge the gender gap in STEM careers including achieving fair compensation without discrimination, equitable advancement without bias, exposure to successful role models in leadership positions, and recognition and respect for scientific and leadership achievements.

Achieving these goals will help scientific achievement be encouraged, valued, and honored no matter the gender of the person behind it. Currently, AWIS GA engages in professional development, sponsorship, and outreach efforts that push them towards their goals.

In March of 2019, the organization participated in the Atlanta Science Festival Exploration Expo and the March for Science. Moreover, they host guest speakers to run career seminars, such as the one delivered by Dr. Marina Damiano of the Damiano Group for Scientific Communications, and discussion panels on topics such as equitable workplace practices.



Progress does not have to start at the career level, however. The lack of involvement of females in STEM during youth is a significant factor in the underrepresentation of women in STEM careers, and AWIS GA intends to redress this issue with their new Youth Program. The AWIS GA Youth Program began as an idea of Maya Chande, a student at North Gwinnett High School, to promote the female involvement in STEM that was seriously lacking on campus. She noticed a widespread lack of confidence of girls in their abilities, especially in science and mathematics courses.

Cognizant of the potential of her female classmates, Maya reached out to other students who had observed similar patterns in their schools in an effort to create an organized movement advocating for females to engage in STEM fields. Therein, AWIS GA Youth was born. In this pilot year for the youth program, they will engage in advocacy efforts within their local schools to connect students with competitions, scholarships, and research opportunities in their areas of interest. AWIS GA Youth is also working on developing a YouTube channel to make their message of gender equality in science more widespread through inspirational videos and features on accomplished young females in the state.

Moreover, they will be hosting their first Career Speaker Summit in April 2019 which will feature a panel of female scientists that will discuss career paths for females interested in STEM. This summit is open to high school students across Georgia to encourage females to take an active role in defining their future.

One does not, however, need to be a student passionate about STEM or a professional devoted to the cause to join the effort in achieving equal opportunity for women in science fields. There are countless ways for the community to support the movement - through AWIS or independently.

Dr. Oliver suggests several such methods including supporting a local AWIS chapter by joining, volunteering, or donating, keeping up-to-date with national events impacting women in STEM through the Washington Wire, joining the AWIS Action Network, a group committed to voicing diversity and inclusion in STEM, reaching out to government representatives to voice support for gender equality in STEM, and simply sharing stories and ideas that can advance the effort.

As daunting of a task it seems to ensure gender equality in STEM fields, it can be done. The Association of Women in Science is one of many organizations

devoted to this mission, and if more people join the efforts of these groups, changes can be made.

“Science is for everyone.”

“You are smart enough.”

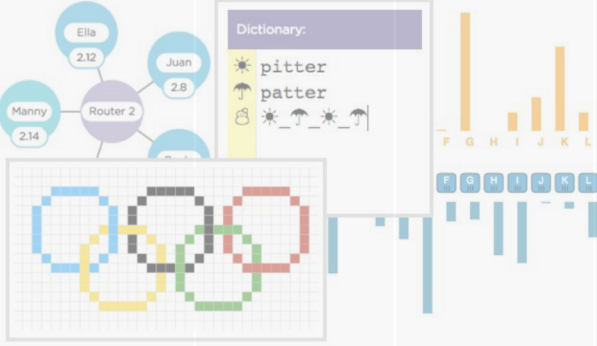
“Yes.”


These are the words that girls in America and around the world should be hearing. These are the words that will push humanity towards a cure for cancer, a resolution to the energy crisis, and a better world in general.

Let them be heard.



A Pathway for K-12 Computer Science Curriculum

Middle School			High School			
6	7	8	9	10	11	12
			[AP] Computer Science Principles <p>More than a traditional introduction to programming, this higher level course introduces students to the foundational concepts of computer science and challenges them to explore how computing and technology can impact the world.</p>			
Computer Science Discoveries <p>An introductory course that empowers students to engage with computer science as a medium for creativity, communication, problem solving, and fun. The curriculum can be taught as a semester or full-year course.</p>						

Elementary School					
K	1	2	3	4	5
Computer Science Fundamentals <p>Designed to be fun and engaging, Code.org's progression of Computer Science Fundamentals courses blend online and "unplugged" non-computer activities to teach students computational thinking, problem solving, programming concepts and digital citizenship.</p> 					



Have more questions?

Your Code.org Regional Partner is here to help

Georgia Tech Center for Education Integrating Science, Mathematics, and Computing
Chris Thompson,
chris.thompson@ceismc.gatech.edu

Or learn more at code.org/apply

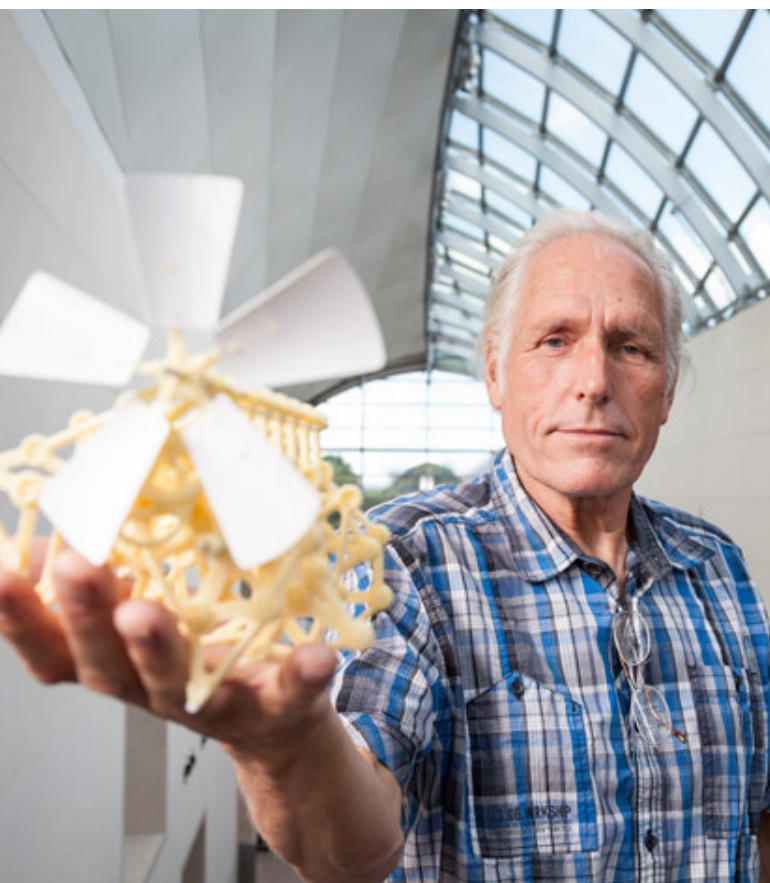


Theo Jansen's **Strandbeest's**

*"I have wanted to do a series of features on Theo Jansen's Strandbeest's (beach animals) for several years. I'm excited to now include this engineering and artistic marvel in Georgia Pathways™ STEM Magazine. Having recently written on the use of PVC in STEM activities, these Strandbeest creatures epitomize this material and resource. This is a must read and **must have** for your personal and STEM activities."*

Wayne Carley
Publisher

STRANDBEEST'S



Theo Jansen

"He describes them as 'skeletons that walk on the wind, so they don't have to eat'. He compares their creation to an evolution of 'new forms of life', and plans to leave them to 'live their own lives' in herds on beaches."

"I'm Theo Jansen and I'm a kinetic sculptor."

Dutch artist, physicist and engineer Theo Jansen has for 20 years, continued to create a fascinating artificial life form, depending on your definition of life. Jansen began building the Strandbeests in 1990. Mindful of rising sea levels and what that might mean for the Low Countries, he imagined a race of wind-powered beach creatures that could bring sand from the water's edge inland to build a never-ending barrier. With his hopeless task of dune creation, the Strandbeest was born.



Strandbeests are dramatically mathematical in concept, engineering marvels in structure, technological wonders in materials applications, and very scientific in their evolution (the systematic accumulation of knowledge), thus the perfect STEM life form.

Although they are still basic, the Strandbeests are now more self-sufficient. “They’ve found better ways to protect themselves against storms, they have sensors that feel the water and feel the hardness of the sand. They’ve become better and better at surviving on the beaches.” One development means they can now walk on soft as well as hard sand.

“It’s easy to walk on hard sand because they’re pushed by the wind, but on soft sand they need a special drive system which is driven by pressed air.

“Now the animals have a way of storing the wind,” says Jansen. “There are wings which go up and down in the wind, and there are pumps connected to those wings which pump air into bottles at high pressure. The pressed air can drive muscles – ski poles that lift the animal and help push it over the soft sand.”

Jansen often strays into the language of the engineer, and it's easy to forget that his creatures are also beautiful. "I don't want to make 'nice' animals, I just want to make surviving animals," he says. They are so low in their evolutionary development I still see them as machines."

Jansen elaborated, "In the middle the beests have this sort of spine. The spine makes a circular movement, and that circular movement is transformed by a number of tubes to a walking movement by the shoe which is under there. And this particular movement is to do with the proportion of the lengths of the tubes which are in-between the spine and the shoe. The proportions are based on thirteen numbers. And this particular proportion takes care that the animal stays on the same level while walking.

And that's the special thing of Strandbeests, because normal animals always toss up and down as they walk, but the Strandbeests stay on the same level. You could see this proportion of thirteen numbers as the DNA code of the Strandbeests.

I published this DNA code on my website. Since then, thousands of students around the world are building Strandbeests. And all these students, they think they're having a good time.

They think they're happy. But in fact they're being used for Strandbeest reproduction! So the Strandbeests abuse students for their reproduction.

And there's a new kind of Strandbeest that doesn't survive on beaches. They can survive in student rooms and bookshelves. This is in fact a better environment than on the beach. Now in all corners of the world you see appearing these small beests, and this Strandbeest reproduction went into an acceleration a few years ago. Two guys came to my studio, and they put something on my table: a walking Strandbeest. And this Strandbeest turned out not to be assembled but to be born. It was born in a 3D printer.

3D Creations



Nowadays you have special 3D printers which can make moving parts and moving things which you don't have to assemble. They come born in one piece. You can imagine what happened next. You can put a series of 0s and 1s on the Internet – the DNA code – and everywhere around the world you can print out these beests."

Kinetic art is art from any medium that contains movement perceivable by the viewer or depends on motion for its effect. Canvas paintings that extend the viewer's perspective of the artwork and incorporate multidimensional movement are the earliest examples of kinetic art.

Kinetic art is a term that today most often refers to three-dimensional sculptures and figures such as mobiles that move naturally or are machine operated. The moving parts are generally powered by wind, a motor or the observer. Kinetic art encompasses a wide variety of overlapping techniques and styles.

There is also a portion of kinetic art that includes virtual movement, or rather movement perceived from only certain angles or sections of the work. This term also clashes frequently with the term "apparent movement", which many people use when referring to an artwork whose movement is created by motors, machines, or electrically powered systems.

The Mechanism



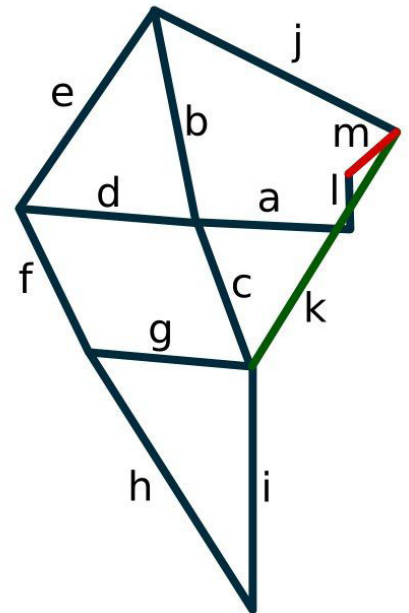
RTA

Theo Jansen Linkage

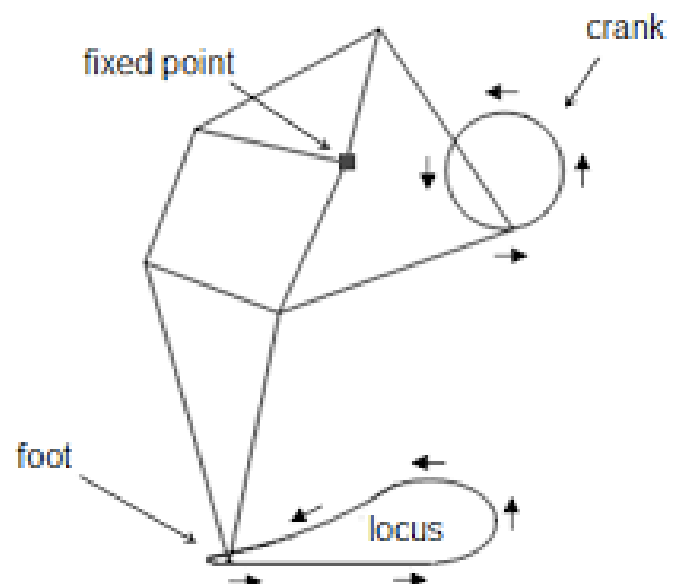
11 Holy Numbers

alley.ryan.2020@gmail.com

a: 38
b: 41.5
c: 39.3
d: 40.1
e: 55.8
f: 39.4
g: 36.7
h: 65.7
i: 49
j: 50
k: 61.9
l: 7.8
m: 15



*not to scale





Animaris Ordus Parvus

Make your own Mini Strandbeest that walks with the wind or by hand. This model is made of plastic, includes illustrated and written instructions, and requires no special tools. Assembly time is approximately 90 minutes and is suggested for ages 8 and up.

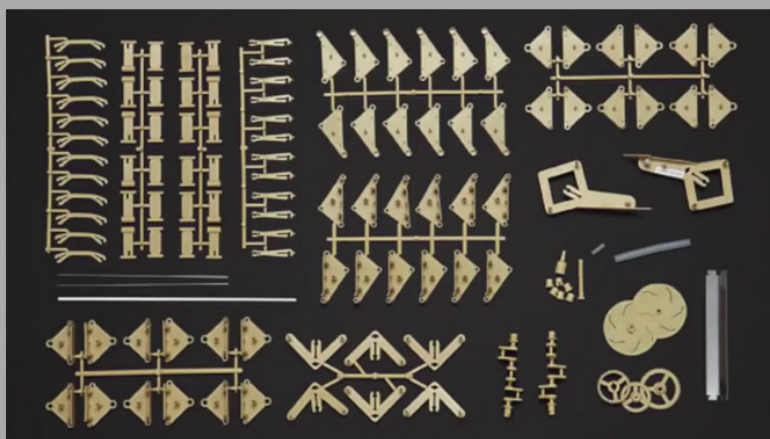
Assembled dimensions are:

Height (back of the beast): 11cm (4.3")

Height (top of propeller): 17cm (6.7")

Width: 13cm (5.1"), Length: 20cm (7.9")

\$35.00 – [Buy](#)



Rhinoceros - Mini Strandbeest Kit

Make your own Mini Rhinoceros that walks with the wind or by hand. This model is made of plastic, includes illustrated and written instructions, and requires no special tools. Assembly time is approximately 90 minutes and is suggested for ages 8 and up.

Assembled dimensions are:

Height (back of the beast): 15cm (5.9")

Width: 13cm (5.1"), Length: 17cm (6.7")

\$35.00 – [Buy](#)

"I do not plan to be an engineer or scientist."

I do not plan to be an engineer or scientist, so STEM is not for me. Becoming knowledgeable about STEM is not about the 0.01% who might become Ph.D. researchers or the 1% who might become engineers. In this data-informed, technology intensive 21st Century the entire populace needs to become STEM literate. We all need STEM thinking skills.

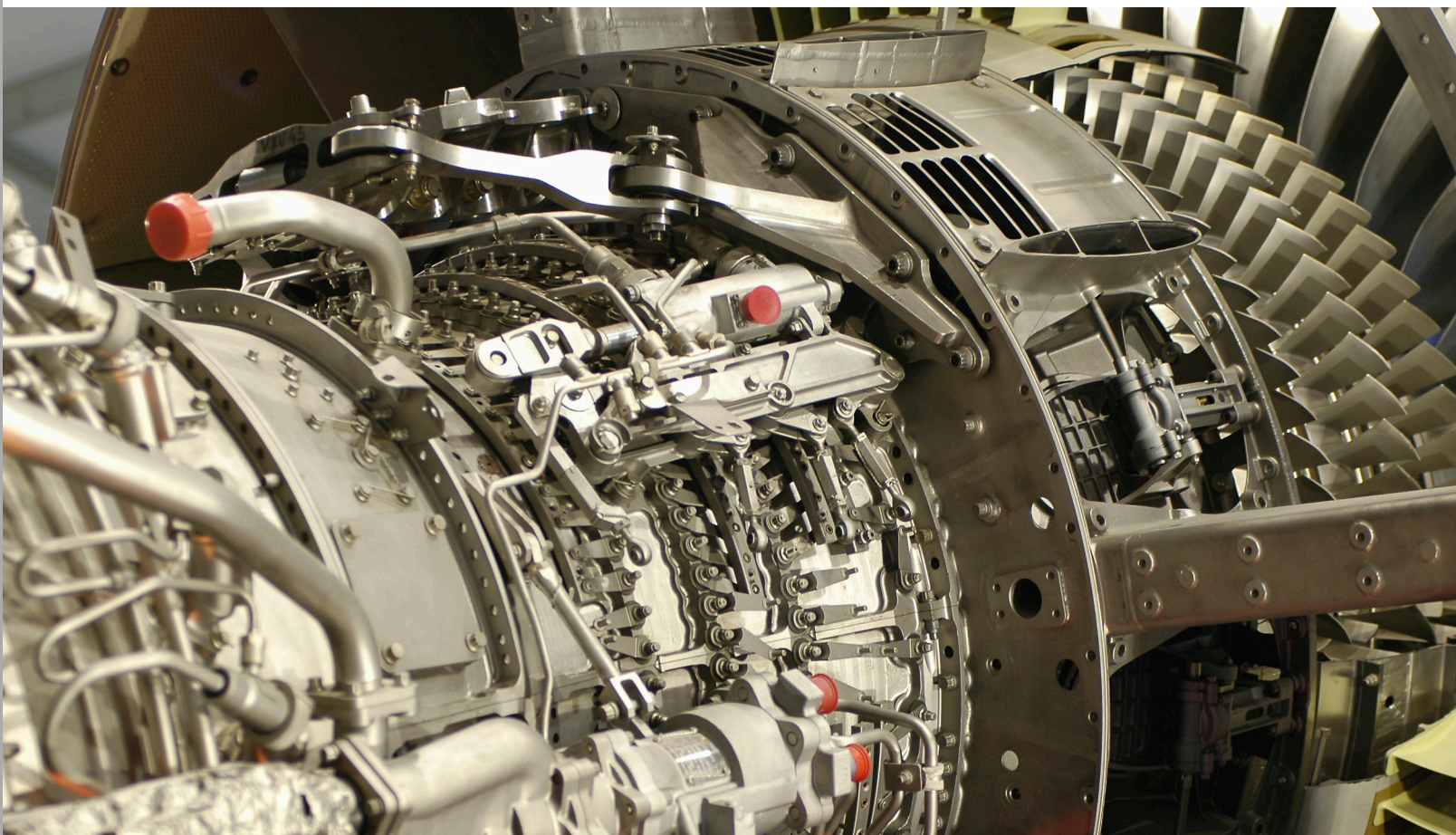
Many apparently non-STEM jobs have become STEM jobs, especially in the trades. Do you know that the average new car has about 50 microprocessors? Forget about crawling under it with a few of your Dad's old tools to fix it.

Moore's Law of computers, which has resulted in the iPhone being equivalent to a multi-ton supercomputer of the 1970's, has affected most other trades as well.

But perhaps the most important reason for everyone to become STEM literate is to build a more informed citizenry. In that way we individually and collectively become better decision makers about all the options that our world and we face. STEM is not only for Ph.D. researchers. It's for all of us!

Dr. Richard Larson

Mitsui Professor of Engineering Systems at MIT



STEM Success is NOT just about
“activities”.

STEM success is about-

*“Connecting the intellectual dots between
curiosity and investigation in preparation for a
career path.”*

That is why EVERY teacher in
every subject is a STEM
teacher.



Please make this is available to your
students.....and their parents.....

Technical knowledge is the **foundation**, but

NOT THE KEY to your success

by Sol Rosenbaum

What's the standard path to success in engineering? While you don't necessarily hear this question phrased as such, it is certainly something that future engineers have in mind when they start their schooling.

Does it start with an engineering degree from a top university? Is it further enhanced by a graduate degree from the same institution? Where do licenses such as becoming a Professional Engineer fit into the mix?

I think that most people would agree that this is certainly a combination that would likely lead to success. However, what I have found over the years is that there are engineers that did everything that they believed they were "supposed to do", but are still not where want to be. So why aren't they moving up the ladder or getting the jobs opportunities they really desire?

The honest truth is that all these achievements do is get your foot in the door. While this might go against the common assumption of many in the STEM field, I don't think technical knowledge is the key to your success in the engineering field.

I firmly believe that technical knowledge is not the key to your ultimate success in this field. Perhaps I have a slightly unconventional opinion on the topic, but keep reading and I think you will find that it is not so outlandish after all.

Let's dive into three of the primary non-technical skills that have been key to my career success thus far and ones that I preach to the younger engineers I mentor.

Written Communication:

Have you ever heard someone say "you write like an engineer"?

When someone uses a line like this, it is never meant as a compliment. This line is in reference to the age-old adage that engineers are too focused on the numbers and just don't know how to express themselves well in writing. I'm very thankful that the engineering school I went to took a slightly more proactive approach to this problem. Just like the liberal arts majors, all of the engineers had to take a required writing class in their freshman year.



While this is a step in the right direction, the fact still remains that many engineers have poor writing skills. I generally attribute this to two primary reasons. First, writing is not often required as a secondary skill for engineering classes. For example, if you took a history class, the primary objective is the history lessons, but you would also develop your writing skills through required essays and research papers. This is not something that is present in most core engineering classes.

Second, the culture of engineering is one of math and science. This is certainly due to the fact engineers require an interest and achievement in these areas to enter engineering. However, I think it goes even further than that to the point where

it is a societal push for strong writers to enter liberal arts and strong math & science students to enter STEM. Once this natural selection occurs, the general interest for the engineering community is one that often shies away from writing.

One of the electives I took in engineering school was creative writing and it was highly beneficial. Most importantly, it taught me writing skills from a vantage point that was outside of engineering. This is crucial because the readers of your material are often not technically knowledgeable in your topic. The ability to provide them with a clear & concise report is key towards getting approval for a project or promoting your field.

Action Plan for Improvement: If you are still in school, make sure to include some writing classes in your class selections. Personally, I would recommend a general writing class, but a technical writing class can be useful as well. If you are already in industry, you have two primary courses of action. The first is to find a writing course at a local college or training facility. Similarly, there are writing clubs that you can join that work on this skill in a group.

Second, discuss with your manager your desire to be more involved in the writing process of reports or newsletters where you can write more often. As with many other skills, deliberate practice will lead to improvement.

Public Speaking:

I remember comedian Jerry Seinfeld once note that people are more afraid of public speaking than they are of dying. Therefore, if you are at a funeral, you are better off being the person who passed away than the person giving the eulogy.

Yes, he is exaggerating for comedic affect, but is he really that far off? Public speaking is one of those things that simple terrified most people and they take great lengths to avoid it. This creates an opportunity for those that are willing to work on this skill.

When you think about public speaking, what comes to mind? For many, the



initial reaction is to think of people like Tony Robins or perhaps the pastors on Sunday morning TV who speak to groups numbering in the thousands. However, this only catches the far end of the public speaking spectrum.

While you may never come close to an audience of that size, public speaking skills are actually something that you can use on a daily basis. This can include presenting your ideas to your engineering department or to a group of investors. If you don't have the ability to push your ideas forward and gain buy-in from others, then you are setting yourself up to be a team member and never a team leader. Being able to publicly convey your ideas is one of the most powerful ways to gain buy-in from others and flourish in your career.

I was first introduced to this skill during my undergraduate studies when I took it as an elective. Honestly, I heard it was an easy A from a friend and wasn't really thinking about it as a lifelong skill. Now, when I look back at that course, I realize it was one of the best college classes I took and one that has really helped over the years.

From my time as an undergraduate student, I remember a professor who was generally viewed as a fairly weak professor. He wouldn't explain the material well and would bounce between topics with little organization to his lecture.

It was only after I spent some time seeking help in his office hours that I realized he was clearly a brilliant engineer in his field of expertise. In this one on one setting, he had a great knack for explaining the material sensibly and clearly. However, when he got in front of the class, he just froze and the delivery was painful to watch.

Unfortunately, he is far from an anomaly when it comes to brilliant engineers who fumble through their presentations. It's unfortunate because this really diminishes their ability to showcase their work and/or research.

While I am generally a very extroverted person, public speaking was something that used to terrify me. I am now at the point in my career where I have presented to audiences of up to 50-60 attendees and I am feeling more and more comfortable all the time. However, as with most skills, there is always room for improvement and this is one of the primary ones that I work on regularly.

Action Plan for Improvement:

As with writing, if you are still in school, make sure to take advantage of elective classes in public speaking. Some engineering schools have classes geared towards engineering presentations which can combine general public speaking skills and specific applicability to engineering situations.



If you are in industry, I highly recommend you check for Toastmaster International chapters in your area. Toastmasters is an organization with chapters all over the world that focuses on public speaking and leadership skill development. I attend the meetings at my local chapter and have found it to be a great way to continue my development in this area.

Another idea is to start a lunch & learn program at your office. Set up a program where each department or person within the department has a chance to present their work to the rest of the group.

Not only will this help improve your public speaking skills, but having better knowledge of the other department in your company will give you a better “big picture” view when it comes to the work within your area.

Networking:

To most non-marketing people, networking is something you do when you are looking for a job. Many people do not think about networking when they are happy in their current situation. However, this is a short-sighted mentality that may hurt you in the future.

I’ve heard all of the excuses and they usually fall into one of two categories; either the person truly doesn’t see the need for the network or they are looking for an excuse to not do the work to build & develop a network. The former category can be dismissed once people truly understand the power of a network beyond its use for job searching (although that is a great use of it). Likewise, with a few simple mindsets and techniques, the latter can be shown to be untrue.



So is a network only useful for job searching? I will concede that the greatest usage for your network is in connection within the job search realm. However, just because you are not looking for a job NOW, does not mean that you should delay developing your network. I like to compare it to hurricane preparation. Waiting until the storm is approaching to prepare your house for impact is going to lead to poor results compared to your neighbor that gives it some forethought.

In job terms, if you got fired tomorrow, would you be able to find a job, in your field, without settling, within a few days? Similarly, for new graduates, the job seeking process can take time and networking as an undergraduate will give you a jump on the process.

Over the year, I have used my network for several other purposes. For example, one of the engineers that I hired to work on my team was someone that I met on LinkedIn initially. I have also used my network as a way to find information on a difficult engineering situation as well as using it as a way to help others get jobs. The main thing to keep in mind is that your primary focus should be the-

QUALITY OF CONNECTIONS and not the QUANTITY OF CONNECTIONS.

A quality network is something that can take time to develop and will take constant care to keep it active, but is not really a time consuming project per se.

It IS something that requires continuous effort, but you can see tremendous results in just an hour per week.

Action Plan for Improvement:

Regardless of where you are in life, start networking to some degree today. Begin by activating a LinkedIn profile and building out all of the sections so that you have an engaging profile. Your initial connections can be people you know personally, but can be expanded to include people who work in the field you are pursuing. It is important to let them know WHY you want to connect or perhaps what made you reach out to them. Simply sending a blank or template connection request will often be rejected.

People like to connect with others with whom they share similarities. This does not have to be strictly about engineering similarities and having non-engineering connections can often be the key to a strong connection. These can include people who went to the same engineering school as you, ones who also went to Boy Scouts, or even a shared interest in the same sports team. Once you find that connection point, they will be more open to engaging with you and that is the key to an effective network.

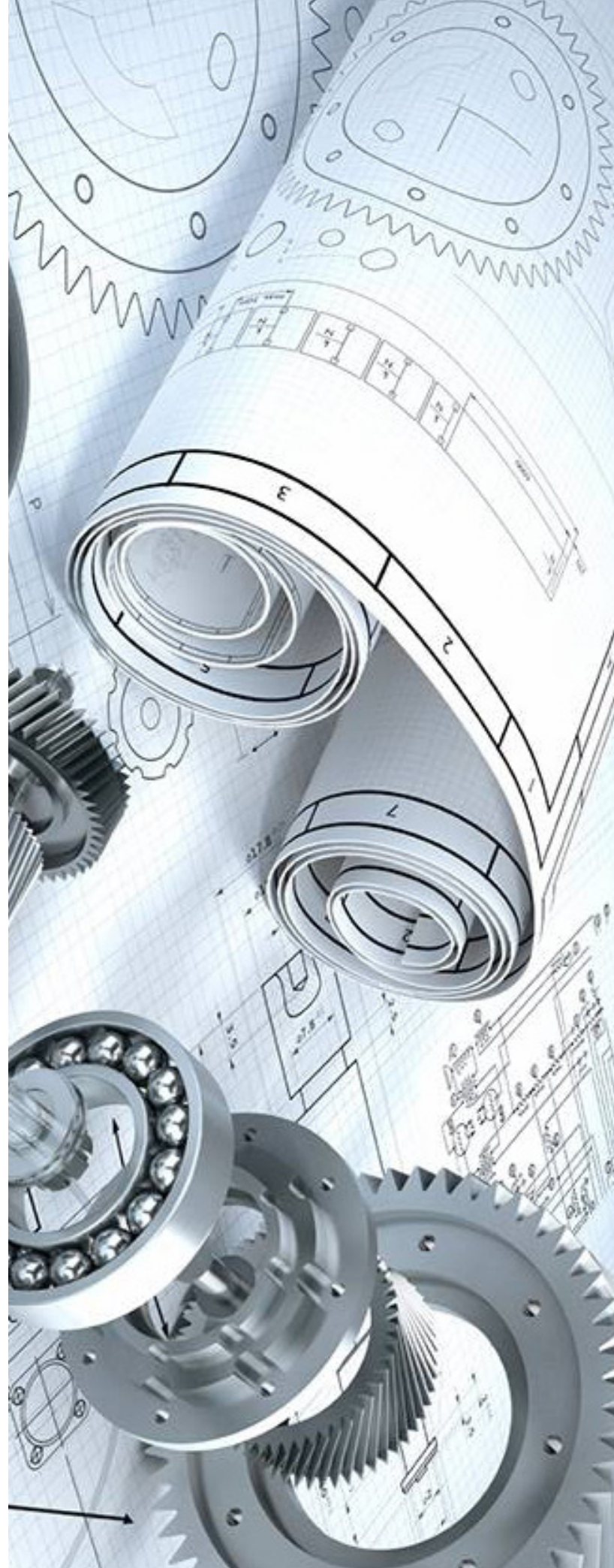
So where does this leave us?

Does this mean that you wasted your time working on your technical skills or that they can be ignored? Absolutely not. My intention here is to share my opinion that it would be a missed opportunity to focus strictly on the technical side of your skills with the assumption that this is what will lead to success in your career. Undoubtedly, having superior technical skills are certainly an asset. However, if one does not partner them with some of the non-technical skills I mentioned above, they will end up limited in their career.

About the Author:

Sol Rosenbaum is a licensed Professional Engineering and Certified Energy manager with over 17 years of experience in the mechanical/energy engineering field.

He is currently the Director, Green & Energy Projects at GRS Group. Additionally, he has a passion for mentoring younger engineers and shares his material on his website at www.TheEngineeringMentor.com.



MOMENTUM

Dr. Reginald Windom

Psychological momentum is a powerful force in school, life, sports, and business. Recently many of us were glued to our screens watching psychological momentum play out on the courts of the NCAA Basketball Tournaments.

For reasons unknown, the selection process of the NCAA Tournament pits often unexpected competitors against one another, regardless of past performance, resulting in unknown teams sometimes upsetting larger, more talented rivals through sheer will to win.

As school continues to challenge your short and long term goals, attitude from day to day, self esteem, abilities, mood and behavior it's important to be reminded that all of these influences are actually controllable.

As we watched with bated breath, the March Madness Tournament brackets, the display of psychological momentum and fortitude we witnessed during March Madness can be a powerful lesson for school, business and life.



momentum;

noun

mo·men·tum \mō-men-tm,

- the strength or force that allows something to continue or to grow stronger or faster as time passes/

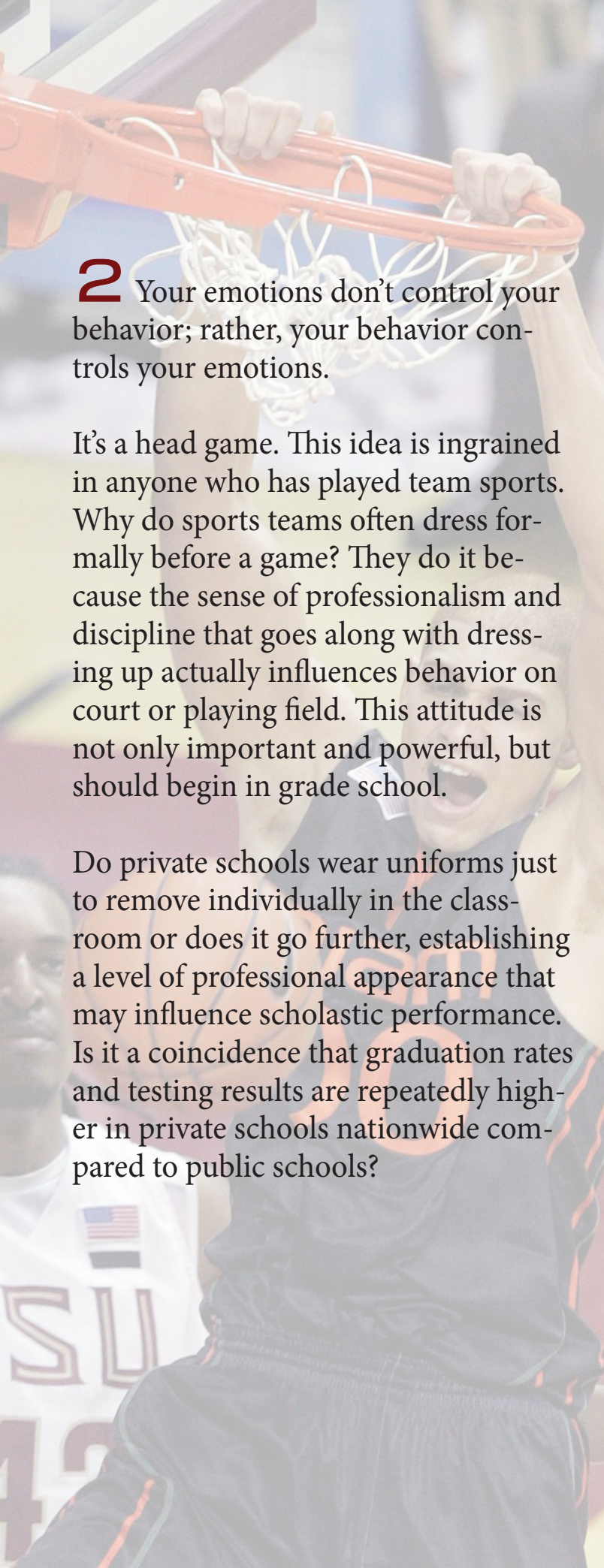


1 Understand that it's all in your head. Psychological momentum is defined as a state of mind in which an individual or team feels things are going unstoppably their way. It's a concept well known in the world of sports.

According to the American Psychological Association's Review of General Psychology, 93% of basketball coaches believe their performance is "crucially determined by momentum." The impact is so strong, studies have shown that coaches frequently change their overall behavior and adopt a more

aggressive strategy after a single successful play early in the game. When it comes to school, a similar psychology plays out. Observers are often amazed at a student's ability to excel in a subject after a short series or even single successful grade result, boosting confidence, attitude and hope.

This momentum isn't necessarily due to specific successes, but rather how we perceive the actions we take afterward. It maybe a simple C+ rather than that regular D that builds a sense of momentum that keeps us moving forward.



2 Your emotions don't control your behavior; rather, your behavior controls your emotions.

It's a head game. This idea is ingrained in anyone who has played team sports. Why do sports teams often dress formally before a game? They do it because the sense of professionalism and discipline that goes along with dressing up actually influences behavior on court or playing field. This attitude is not only important and powerful, but should begin in grade school.

Do private schools wear uniforms just to remove individually in the classroom or does it go further, establishing a level of professional appearance that may influence scholastic performance. Is it a coincidence that graduation rates and testing results are repeatedly higher in private schools nationwide compared to public schools?

Once you adopt the "as-if" principle, your internal psychology shifts. Challenges and obstacles begin to be viewed as opportunities, rather than reasons for despair. We can celebrate successes, no matter how small, and eventually a feeling of positive momentum takes hold.

3 Build momentum in every class Naturally, coming to these realizations and, more importantly, putting them into action takes a lot of time and effort. What emerged from this introspective process are five key principles that can be applied to any subject.

-Act like you're already succeeding. Conduct yourself in a manner that exudes confidence. Come into class composed, well rested, and energized.

-Focus on the positive. Don't dwell on problems. Instead, look at them as opportunities for greatness. Be realistic, but try to frame things positively at all times.

-Celebrate victories. It doesn't matter how small they are. Make sure your teacher and parents know about wins and recognize their contributions every time.

-Show excitement. Show optimism in everything you do, regardless of the grade you get or class you're in.

-Don't give up. If you find yourself short on success and start to see pessimism on the rise, don't despair. It takes determination to build momentum. Just keep pushing and you'll get there.

Remember.....it's all in your head.



"Keep pressing..."

Rome

Atlanta

Athens

STEM is Georgia Wide

Columbus

Macon

Savannah

Albany

Brunswick

Valdosta