# Internships Value for Georgia

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### The Interview What you need to know

January 202

# Outdoor Education





Every career requires STEM skills

### 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 fields)

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)

MATHEMATICS: "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 and STEM careers.

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 2000. Later, the organization's name was re-branded to TAG Education Collaborative to facilitate our role as the leaders for K-12 STEM education in Georgia.

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### Unification of Theory

Song-Chun Zhu, PhD

### Working to Enhance STEM

Ben Ingham Northrop Grumman Corporation

Language Arts

WAYNE CARLEY

Hyperion

**Outdoor Education** DAVID J. LOCKETT M.ED. Welcome to 2021 and an exciting calendar of workforce development opportunities. Our premier program is the TAG-Ed Summer Internship Program, created in 2009 to give competitive young Georgian's an opportunity to work on meaningful projects, not only honing their technical skills, but also developing the professional skills needed to excel through school and into their chosen career field. Mark March 1st on your calendars to begin the request process for both hosts and young participants. The website will be active then to receive applications.

This valuable effort continues in 2021 as many families consider their various options for summer. Of course internships can be a constructive and enjoyable life experience. Their significance to admission officers differs at the under- graduate and graduate levels and depends directly on how meaningful they are to participants.

Internships are intentionally designed to benefit students, as well as the host employer sponsoring them. Interns may still fulfill entry-level tasks, such as cleaning research labs, making copies for meetings, or being cashiers while also participating in activities that broaden exposure to a particular career or industry. For example, interns may attend informational sessions, shadow employees, or have specific projects for which they are responsible. Ideally, an opportunity to reflect on what is learned is built into the internship experience.

At every step of the college admission process, from defining a school list to writing essays to completing interviews, candidates are challenged to articulate who they are and





what motivates them. Internships (in addition to jobs or other types of summer experiences) provide experiential information for young people to reflect upon personal aptitudes. They demonstrate that a student can hone in on an interest and has the organizational skills to make something happen in that arena.

Atlanta offers a vast array of unique internship opportunities across a broad spectrum of industries, such as technology, cyber security, finance, data management, computer science and more, TAG-Ed annual internship offerings are sure to pique the interest of applicants and host's alike. Remember to note March 1 as the official launch of our Summer Internship Program.

Larry K. Williams President TAG / 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 Value

# of the Interview

### By Jane Kellogg

As a new mentor in the Aviation Program at a Colorado Springs High School, starting in the second semester, the students wondered who I was, why I was there, and like them, I wanted to learn more about them. What I saw was a typical high school classroom of students anywhere, some with pink or green hair, slouchy clothes, a few piercings, some in uniforms once in a while, some who were only in class a few days a week, some who had a hard time staying awake, and all the rest.

At that point I totally missed that the students were mostly Hispanic, I didn't know that they were coming from households with a high poverty rate, that over a third of the adults, many of their parents, had dropped out of high school before graduation, and only a tiny percentage of them went on to earn a degree. These things I was yet to learn but they all affect a student's success in the class and beyond high school.

When the coordinating mentor mentioned that the juniors and seniors needed to acquire interviewing skills, as some of them would be seeking jobs soon, he thought I was perfect to be the interviewer since I'm a retired CEO, a general aviation pilot and own an airplane.

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I wasn't equally convinced because a standard business interview form didn't really contain the questions that would capture the information above related to the individual student nor their living conditions at home. Factors which help, or interfere, with their desire to succeed at school. This includes the family members, who they were, how many of them, what educational level they were at, the jobs they have, where they live, and who they lived with.

The existing questionnaires used by school counsellors didn't contain this information so I researched other possible models we could adapt for our purposes. I ultimately created the "Transition Assessment – Student Interview Form." That included questions from a variety of other 'Transition' forms, and added several others specifically related to aviation careers.

The class consisted of 19 students, 15 males and 4 females. This ratio of males – at 79% versus females at 21%, is higher than the worldwide 7% of all pilots that are women today. A statistic that has only increased by 2% since the 1970's when only 5% of women were pilots.



The males welcomed the females in their work groups and later I was to learn that neither group wanted all male or all female teams.

There were several constraints that I could not control since all interviews took place during a normal aviation class:

• The students did not know which day they would be interviewed so they were dressed for class as they normally would which included a lot of old jeans, loose sweatshirts, school team t-shirts, exercise clothes, as referenced above.

• Where we were conducting the interviews was in a partial office/partial storage 'closet', that overlooked the class-room. I carved out a space right around the desk with enough space for the student to sit across from me as I sat behind a desk.

My choice was based on the typical corporate first interview. Later, they will encounter some situations that are less formal, but their first one will likely be set-up like this one.

• Students were nervous talking to me since they knew nothing about me except that I had owned a successful business, and usually wore normal business clothes for classes.

Before beginning the interviews, I had checked with the administration about student privacy issues to make sure that we had the OK to proceed. Student privacy laws are very stringent so if you decide to adopt this practice, check with the administration. It's also a good idea the check with the counselors to be sure you aren't going to duplicate information they already have.

The Mentor Coordinator had the list of

students and after class started, he would pull a person out of class, sending them to my 'office' to be interviewed. When I had completed the individual's interview, if there was additional class time, he would go ahead and send the next one to me.

I greeted each student at the door, shook their hands firmly like I had done in the business world (this was pre Covid-19) and invited them to sit across the desk from me. Before we started, I explained what we were doing and told them that they would get a copy of their completed form that they could take home to show their parents and handed them a copy of the questionnaire. I used the questionnaire itself as our discussion points.

Initially I filled in the questionnaire as we visited. Later, I decided to have them fill

it in themselves. I was surprised to find so many couldn't write the words or even didn't seem to know how to spell common words. When we had finished completing the questionnaire, they went back to class.

They took the questions seriously, taking their time to come up with answers. It was surprising to find that many of the students did not know whether their parents graduated from high school or not or had a degree. The questions that were the hardest for them was thinking of the number of siblings because some were 'stepsisters and stepbrothers' that didn't live in their home.

Their home life ranged from being an only child to having eight children in the family. In this case, four of the eight had



not graduated from high school. There's a few where the mother and father were divorced and in some cases their Stepfather lived with them.

Two of the students lived with a grandparent. I was later to find that the father of one of the student's living with his grandfather had died in a plane crash which made him very nervous to be involved in flying though he excelled in the aircraft build.

Several parents had retired from the military and were not working anymore. For eight of the students, their parents had graduated from college, and two of the parents owned their own business, where the students worked.

The following sections are summaries of information from each of the areas we covered in the interviews:

#### MOTIVATION

When asked about what motivated them to do well in class, five students referenced wanting to be the first one in their family to graduate from college, four referenced making their parents proud, five referenced ways of making them successful including getting high grades, and building a better future.

### SPARE TIME

Five of the students play sports, two work

in their mother's restaurants, two read for recreation, one I especially liked was that he liked going fishing with his dad! Others listened to music, played on their phone, spent time with their friends, rested, practiced band, and one said that he volunteered at an assisted living center.

### AVIATION CAREER CHOICES

Since we are focused on the aviation program, students have been using an aviation curriculum and building an airplane, we gave them the opportunity to choose between a variety of aviation related careers. Not surprisingly the highest percentage of students chose Aircraft Maintenance or Aviation Mechanic since they are gaining those skills now as they are building the airplane. Becoming an Aerospace Engineer ranked second highest and becoming an Avionics Technician was the third highest. Others included being a Med-evac Pilot.

I was puzzled by one who stated he wanted to be a Marine Biologist/Zoologist and have a pilot's certificate. It wasn't until I was in a small airport where a Coast Guard plane was being refueled last spring that I discovered the linkage. When I saw two men and a woman in their flight suits in the terminal, I asked them if they were pilots. All but one said no. They quickly explained that they were biologists doing population studies of the Florida waterways from the air. So, there you are – a flying career I would never have thought about.

### OTHER CAREER CHOICES

We were also surprised at some of the other careers. Three stated a desire to own their own company related to working on aircraft, a couple wanted to be engineers, and one wanted to be a First Responder Paramedic.

### CONCLUSION

Did the information collected make a difference, absolutely because each student was no longer just a face in the crowd but was an individual who had a life outside of school. Coupled with the time they spent with the other five mentors during the build classes they seemed to grow in self-esteem and confidence.

The interviews also provided definitive information regarding each of the students living reality in a high poverty area that we could include in grant requests for funding for the aviation program and others. Plus, the interview information regarding the careers they want to pursue will help us as we work with industry for aviation related internships resulting in better matches of students to opportunities.

Jane Kellogg has a Master of Science Degree from Oklahoma State University with 15 years' experience teaching science in public schools and as an Adjunct Professor. She is a retired CEO of Kellogg & Sovereign® Consulting, LLC, a company she founded, an Instrument Rated Pilot, and Board Member of EAA Chapter 35.



## The Potential of Artificial Intelligence

## Intelligent Science - Unifying Newton and Darwin's Theoretical Systems









Natural Language

**Cognitive Science** 

**Machine Learning** 

Robotics

#### By Song-Chun Zhu, PhD

Professor of Statistics and Computer Science, UCLA / Founder and Chairman, DM Group

Song-Chun Zhu is a Chinese-American computer scientist and applied mathematician known for his work in computer vision, cognitive artificial intelligence, and robotics. Zhu founded DMAI as an AI startup to lift humanity by developing cognitive AI assistants and platforms that make personal connections to individuals. He is widely recognized as a global thought leader and innovator within the field of artificial general intelligence.



Game Decision/Ethics

We have now explored the critical issues at the frontier of each of the six disciplines of AI, and I have shown why I believe they are unifying under a common cognitive framework. But how will a mature scientific discipline emerge from these six competing areas? With AI becoming the "science of intelligence," what should this unified scientific discipline be? In my opinion, physics is by far the most developed science; as such, its historical development can teach us about possible paths forward for AI.

"I loved physics so much in high school that when I applied to the University of Science and Technology of China (USTC) in 1986, I wrote down 'modern physics' as my preferred major. But when my brother saw the application form, he worried about the lack of careers in physics; though neither of us had ever seen a computer before, he changed my major to computer science without my knowledge. So I ended up in computer science by accident; but I've always kept a soft spot for the beauty of physics."

### Four Sentences to Remember

When I started university, I noticed that my Introduction to Mechanics textbook had been authored by the university's executive vice president and his wife. This was an enduring memory for anyone who attended USTC. And the introduction in the book's very first page stunned me. Here are four sentences that stood and continue to stand out to me:

### The Bag of Tricks Model

Compared to physics, AI research so far has paid little attention to the possibility of a unified model. But by resolving some small problems, a unified theory of AI has recently garnered more than considerable attention.

"The history of physics is a history of the pursuit of the unity of the physical world.

The first great unity is Newton's classical mechanics, where he, through gravity, established a unified interpretation of the movement of planets of the solar system and the movement of seemingly complex objects.

The formation of a scientific system established a firm belief: that there is a complete causal chain in the physical world.

The responsibility of physics is to find a unified force that governs various phenomena of nature."

It is a dream, to be sure; one almost needs faith to believe in it. But if one does, it is a dream worth working towards. In over three hundred years since Newton's time, physicists are still working, ever so gradually, to discover a splendid universal model.

In over three hundred years since Newton's time, physicists are still working, ever so gradually, to discover a splendid universal model.



Some renowned professors in the 1980s believed there was no unified explanation for intelligence; rather, they saw intelligence as more like a "bag of tricks." All intelligent beings did was apply designated problem-solving rules to their corresponding problems. But this perspective, in my opinion, is superficial and short-sighted.

When David Mumford left pure math to study AI in the 1980s, his vision was to build a mathematics of intelligence. This was quite a transition for such a wellknown and distinguished mathematician. I have not seen another scientist in any field make such a big leap.

In my statement of purpose for my graduate school applications, I wrote that I wanted to explore a unified AI framework. There was no internet at the time, and I remember that the Department of Science and Technology had just replaced their obsolete dot-matrix printer with a laser model. I had never heard of Mumford.

Most graduate programs rejected me, but I was able to follow my advisor to Harvard. In the same year, Yingnian Wu, a fellow two years my junior from the same department at USTC, was admitted to Harvard to study statistics, and we became roommates.

Wu's understanding of physics and statistics was profound, and his knowledge has benefited me tremendously during my twenty-five years of working with him.





Looking back, I see how lucky I've been to have crossed paths with brilliant individuals like Yingnian Wu at crucial junctures in my own research and learning. Work of this great magnitude is rarely, if ever, advanced solely upon the shoulders of one person, which is why, in 2004, I created a non-profit institute in my home-town of Ezhou, Hubei, China, and named it the Lotus Hill Institute. In the above photograph, taken at the Lotus Hill Institute in 2005, we had a mission of collecting annotated image data, which marks the beginning of the data-driven paradigm and statistical learning in AI. Working shoulder to shoulder, we were successful.

### From Big Data to Big Tasks

The version of AI we encounter daily is the AI of big data applied to master small tasks like image recognition, speech transcription, language translation. It's AI that can play chess and video games. It's parrot mode AI, not the AI of the future.

With ever-increasing realism and faster speed in rendering methods using dedicated hardware, the synthetic data from the virtual world is getting ever closer to the data collected from the physical world. In these realistic virtual environments, one can evaluate any AI method or system from a much more holistic perspective.

We can use Virtual Reality using these simulation methods to measure whether a system is intelligent not only by its performance on a single task but through a combination of tasks: the perception of the environment, the planning of the actions, the predictions of other agents' behaviors, and the ability to adapt learned knowledge to new environments for new tasks. To afford such a task-driven evaluation, physics-based simulation for multimaterial multi-physics phenomena will play a central role.

Cognitive AI needs to accelerate by adopting more advanced simulation models from computer graphics to benefit from the capability of highly-predictive forward simulations. This acceleration will allow us to grow a crow, to go beyond deep learning, making us capable of integrating the dark aspects of cognition.

### One last look at the Crow

Earlier we discussed how we study two basic aspects of physical and biological intelligent systems. To review:

First, the innate tasks and value function in intelligent species. These are the bare necessities that we are evolved to fulfill. Animal behavior is driven by a range of survival tasks, determined by a value function. This value function is an evolutionary phenotype emerging from a landscape in which the fittest survive.

Darwin proposed natural selection as a concept but did not explain it mathematically. Only later did we find that genetic mutation is actually the action of an entire species on its value function on an evolutionary time scale. The value function's topographic map I described previously is, in fact, borrowed from biology.

Second, the objective reality and causal chain in the physical environment.

This is the perception of the physical world and causal chains within it, governed by Newtonian mechanics.

Ultimately, for artificial intelligence to become intelligent science, Darwin's and Newton's theoretical systems need to be unified.



### Taking Flight

In 2016, I visited Westminster Abbey, where I was surprised to see the graves of Newton (1642-1727) and Darwin (1809-1882), two scientific geniuses who completely changed how we see the world, only a few meters apart. How long must we wait before we unify their grand visions?



In his "Autumn Song," Tang Dynasty poet Liu Yuxi (772-842) composed lines that capture a bit of the imaginative leap we will need to take to advance this new realm of scientific research and innovation:

### Autumn Song By Liu Yuxi

Since olden days we feel in autumn sad and drear, But I say spring cannot compete with autumn clear. On a fine day a crane cleaves the clouds and soars high; It leads the poet's lofty mind to the azure sky.





### Working to Enhance STEM at Every Level

#### **Ben Ingham**

Northrop Grumman Corporation



#### STEM is vital to our nation

Our nation's security and economic prosperity depend on a highly educated work force with advanced skills in STEM. The shortage of STEM professionals in our country is a major contributor to our sagging innovation and competitiveness.

Northrop Grumman is a company that is long-known for its innovation and ability to apply technology and unique solutions to solve some our nation's most complex challenges in areas such as unmanned systems; cybersecurity; command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR); and logistics and modernization.

We are currently engaged in a multitude of programs to foster and improve education at all levels, particularly those that will further STEM education and encourage more young students to enter the field.

### Northrop Grumman and the Northrop Grumman Foundation

The Northrop Grumman Foundation, a charitable giving arm of Northrop Grumman Corporation, provides support for education opportunities to our nation's youth and educators. In addition to the company, the Foundation is committed to supporting diverse and sustainable programs that create innovative education opportunities. The priority is to provide assistance to national level STEM programs that span preschool and elementary school through collegiate levels and put an emphasis on reaching diverse populations.

Employees at the company's many locations are engaged in their communities. Employees actively volunteer in support of several STEM organizations, causes, and programs for local youth. We also donate to local schools to provide them with high-quality STEM materials and resources. Half of the company's charitable giving is directed toward STEM education.

### **Our STEM activities**

Northrop Grumman is involved with many organizations that promote STEM programs in schools and our communities to inspire the work force of tomorrow.

The Northrop Grumman Corporate Citizenship organization is responsible for developing and supporting K-12 education programming that excites students through informal education programs, engages students in STEM technologies and careers, offers professional development opportunities to teachers, and enhances the overall education experiences for students and teachers. These programs are aligned with company goals for talent and technology development.

# Professional Development for STEM teachers

"The Northrop Grumman Foundation has been pioneering programs to inspire science teachers for many years. We have turned our focus to the environmental sciences in recognition of the importance of international environmental sustainability to the health and security of future generations,"

Sandra Evers-Manly President, Northrop Grumman Foundation

Virginia Initiative for Science Teaching and Achievement (VISTA): Recently, Northrop Grumman donated \$1 million to George Mason University to support the VISTA program. The five-year program focuses on high-need schools to improve science teaching and student learning throughout Virginia. VISTA is dedicated to professional development and research in science for elementary teachers and secondary teachers; science coordinators; and university science education faculty.

The VISTA program is a statewide partnership across more than 60 Virginia school districts involving Virginia Tech, the College of William and Mary, Virginia Commonwealth University, the University of Virginia, and James Madison University; and the Virginia Department of Education. The goal of VISTA is to translate research-based best teaching practices, and then apply their findings to improve the delivery of instruction and effectiveness of science education. Additionally, a community of practice is being developed among science educators throughout Virginia.

ECO Classroom: We have seized upon the national interest in environmental science by collaborating with Conservational International to launch the ECO Classroom program. Teachers are taught by Conservation International at its Tropical Ecology Assessment and Monitoring (TEAM) Network's field site at La Selva Biological Station in Costa Rica for an intensive, two-week experience.

After leaving the program, the teachers are equipped to inspire students in their communities through the knowledge they gained while abroad. The Northrop Grumman Foundation is planning additional teacher trips for 2022.

Sally Ride Science: Partnering with the Northrop Grumman Foundation, Sally Ride Science is a program aimed at not only honoring her memory, but equipping classrooms with high-quality resources to aid in the enrichment of students' STEM learning. Educator institutes and science academies offer professional development opportunities, leaving educators with a wealth of knowledge inspired by Sally Ride.

### Students

CyberPatriot: CyberPatriot is a national high school cybersecurity defense competition designed to excite, educate and motivate the next generation of cyberdefenders.

This program is popular and growing – the number of teams jumped from 178 in CyberPatriot II, to 661 in CyberPatriot III. Enrollment for CyberPatriot IV came in at 1014 teams, a 53 percent growth. Starting soon, AFA will develop a middle school component and bring in summer interns who have participated in the CyberPatriot program.

Space Camp: The mission of Space Camp is to be the premier provider of authentic, inspiring and entertaining educational experiences in space science and aviation. We send students and teachers from Northrop Grumman communities across the United States to the program in Huntsville, Alabama. We have funded the program for years, covering travel, tuition, room and board, firsthand astronaut training for the "space travelers," rocket launching materials, and learning aviation principles. Our involvement in Space Camp reflects our interest in introducing middle-school students to STEM education in a unique setting.



VEX Robotics: An international robotics competition where kids at the middle school and high school level, as well as collegiate competitors, build robots to complete a specific task. The participants get a dose of what the "real world" is like by using project management and time management. Northrop Grumman contributes financially to the program and provides employee volunteers who serve as role models and supply guidance. As a result of our involvement, 76 new teams started at 58 new schools serving an estimated 760 students.

University of Maryland Advanced Cybersecurity Experience for Students (ACES): Northrop Grumman Foundation has partnered with the University of Maryland (UMD), College Park, to offer

a landmark honors program designed to educate a new generation of advanced cybersecurity professionals. ACES engages a highly talented, diverse group of students-majors in computer science, engineering, business, public policy and the social sciences—in an intensive living-learning environment that focuses on the multifaceted aspects of cybersecurity and develops team-building skills. Students take on an advanced, cross-disciplinary curriculum developed through industry consultation, and interact directly with industry and government cybersecurity mentors. ACES produces skilled, experienced cybersecurity leaders highly sought by corporate and government organizations.

Cyber Scholars at the University of Maryland Baltimore County (UMBC): The Northrop Grumman Foundation provided a \$1 million grant to launch the program which aims to develop cyber pros from historically underrepresented demographic groups and women.

"Northrop Grumman is proud to support education programs that will develop tomorrow's cyber leaders," said Wes Bush, chairman, chief executive officer and president of Northrop Grumman. "Innovative partnerships like the Cyber Scholars program will further our nation's strategic objective to build a broad pipeline of qualified cyber professionals. I am very pleased the Foundation is partnering with UMBC on this important initiative." The program creates a learning community which will bring in 15 to 20 new scholars annually, further increasing the cybersecurity talent pool.

### Diversity

Northrop Grumman also supports increasing diversity within the STEM fields. We are partnered with the National Association of Multicultural Engineering Program Advocates, Inc., National Action Council For Minorities In Engineering (NACME), National Society of Black Engineers (NSBE), Society of Hispanic Professional Engineers (SHPE), Society of Women Engineers, American Indian Science and Engineering Society, Black Engineer of The Year Awards, Asian-American Engineers of The Year, Women of Color in Technology, Out & Equal, Jackie Robinson Foundation, Great Minds in STEM and other organizations.

Our membership assists these organizations in expanding the engineering and business pipelines through pre-college outreach, assisting undergraduate and graduate students to excel academically, and helping to cultivate future leaders.

Viva Technology and Great Minds in STEM: As a step in continuing efforts to introduce middle school students to STEM careers, employees at Northrop Grumman partnered with the company's Hispanic employee resource group, One Adelante, to bring the nationally acclaimed Viva Technology Program to to Rogers Middle School in Lawndale, California, and Parkland Magnet Middle School in Rockville, Maryland. Viva Technology is a national K-12 education program sponsored by Great Minds in STEM that is designed to engage students, parents and teachers in technology-related activities that stimulate mathematics and science studies.

The program consists of a teacher workshop, a parent session and a student program. Northrop Grumman volunteers from One Adelante — supported the event as speakers and team leaders while college students from campuses near the schools also assisted.

NSBE SEEK: The Summer Engineering Experience for Kids' (SEEK) program, is provided by NSBE in an effort to curb the low representation of African American students in the STEM fields. It is a free, three-week course for grades 3-12, made possible by sponsoring organizations like the Northrop Grumman Foundation. It also pairs students with college-level NSBE mentors.

Funding from the Northrop Grumman Foundation provided more than 30 national diversity association college fund scholarships (totaling over \$140,000) to various organizations including the American Indian Science and Engineering Society, NSBE, SHPE, the Society of Women Engineers, the United Negro College Fund and the Hispanic Scholarship Fund. We also provide grants to SHPE's National Institute for Leadership Advancement and NSBE Regional Programs.

### Workforce: Aerospace and Defense

Aviation Week and Space Technology conducts annual surveys on aerospace and defense workforce trends. In data from a recent Workforce Study, "National Defense," appears as the first choice of young professionals who are looking for a STEM career. The survey also shows how much STEM enrichment programs, which offer team experiences, design projects, and project management activities are useful in preparing for careers in aerospace and defense.

For more information about what Northrop Grumman is doing for STEM education, please go to our corporate responsibility website.

"The majority of students believe that "personal relationships and interaction are the best guides to future employment."





Use it in class. Send it home.

Curiosity and learning are *ageless*.

Please enjoy this issue and **share** with all those teachers who don't think STEM skills apply to them. You have unlimited distribution, so your students and their families may enjoy it too.

Language

by Wayne Carley

Word Origin

*- plural noun* 

; the skills, including reading, composition, speech, spelling, and dramatics, taught in elementary and secondary schools to give students a thorough proficiency in using the language.

### **"19% of high school gradua** How is that ev

Effective communications skills, specifically language and its facets, are critical to effective teaching and to any career our students choose. Is it a STEM skill? There is no doubt. In looking at the dictionary definition, let us begin with the importance of "effective" reading; reading for comprehension and application.

### Reading

With virtually any new job comes the wide variety of forms, booklets, documents, company policies and procedures followed by work related reading of instruction manuals, schematic diagrams, procedures, blueprints, software usage PDF's, trouble shooting steps... the list goes on and on. Since we've learned in past issues of STEM Magazine that "every career" requires STEM skills, all of the above applies from secretary to scientist. Approximately 32 million adults in America are considered to be illiterate; about 14% of the entire adult population cannot read. Nineteen percent of high school graduates in America cannot read. How is that even possible? To press the issue of reading importance, 70% of prison inmates are illiterate. How can a person be expected to hold a job and any kind without reading skills? I was shocked at these recent statistics but it does make the point.

Reading for comprehension and then application is a vital STEM skill without exception. The effective application portion is what keeps you employed. Drop the ball on following instructions accurately and you'll find yourself unemployed.

### tes in America cannot read. en possible?"

### Composition / Writing

The writing applications of language arts is slightly less necessary within the entire scope of careers, but the majority do require the ability to submit reports, requests, updates and so forth.

Spelling and grammar should not be an obstacle with current computer literacy correction features but you still need to have proficiency in their use....and use them. Some careers are very composition heavy such as this magazine, marketing, proposal submissions of all kinds, website construction, social



media, sales and more. The success and productivity of many companies relies heavily on accurate and compelling composition skills.

Through the artistic combination and composition of the written word we form very persuasive and compelling statements to sell products, pass laws and legislation, change peoples minds and alter the course of the present and of history.

### Speech

The number one fear of Americans is speaking in public. Small groups or large, most people freeze up under those conditions....conditions necessary for many key STEM careers and communications roles. Speech is very powerful and very dangerous. Once a word is spoken you can't take it back.

The advantage of being an articulate, composed and effective speaker is a huge asset to every company I can think of. Poor verbal grammar, mispronouncing words, not expressing ones self effectively and failing to accomplish the end goals of speaking serve no good purpose other than making us look ill-prepared and irresponsible as speakers. This applies to every relationship we have at school, work, play and situations where it really counts. or not making ourselves clearly understood takes much more time than doing it right the first time.

# "Think before you speak"

### 1. Articulate:

(of a person or a person's words) having or showing the ability to speak fluently and coherently. "an articulate account of their experiences"

- *Eloquent, fluent, effective, persuasive, lucid, expressive, silver tongued;*
- Synonyms: intelligible, comprehensible, understandable

There is no question that speech can be very artistic as in the composition of a powerful speech spoken by an eloquent speaker. It's the combination of the words of the speech and then more importantly, the delivery or speaking of those words. One without the other is not nearly as powerful.

# Why is this important for teachers and students?

We are all speaking....everyday. There is a saying that, "the more a person speaks, the greater the chance of saying something stupid".

Having to apologize for "mis-speaking"

"What does this image mean?" The recent movie "The Arrival" is an interesting and compelling example of how critical language can be. Even a slight misunderstanding can have dire and irreparable consequences.

The symbol here means...... .....absolutely nothing. I put my coffee cup down on a napkin and just let it bleed coffee. Could I give it meaning in some sort of alternate language? Sure I could, and if you saw the movie, you may have jumped to conclusions.



To teach effectively, articulate and persuasive language is a potent combination. This requires us to think before we speak, but on a daily basis, that's not our experience and is a real challenge.

Verbal teaching isn't a "speech" as much as a rapid fire, shoot from the hip, respond as necessary fluid experience. That is where we usually make our mistakes. Being human means we can lose our temper, say things we don't mean and create regrets. In the course of an entire semester I just don't see a way to prevent that. Students will need these speaking skills for a variety of uses, usually for their own ends. A persuasive conversation with my teacher may result in a better grade on that report, or a second chance. Students will have to apply for work or college someday soon both in writing and verbally and yes, it will determine if I hire you or not or allow you into my University.

Now is the time to address these skills, both the art of language and the art of composition.

"We can create new meanings by putting two words together. Instead of writing about an event, we can describe and stimulate the details and feelings under which that event occurred. You can experience what it was like to feel, see or be part of something—with the simple use of words.

Language is an art. You have to learn to hold a paintbrush before you can paint. And from there, your possibilities are endless."

Camila Martinez-Granata

Regardless of the class you teach, here is a great, brief exercise to make the point to your students. ( count how many times you say "Ummm" and "You know." )



### School or Home Exercise:

In a few paragraphs, about two hundred words, students must convince their teacher why they deserve a better grade in that class.

This has practical applications while making the point of how they may use language as an art-form, moving forward in school and life. Skills used will probably include persuasive words, specific meaning, artistic composition with the best combination of words, and brevity of length making it much more important to use language effectively.

Students will have to really think about what to say rather than just blurt out a disorganized, random and messy bundle of words with little forethought of effective communications or expectation of results.



Abraham Lincoln; One of Americas most artistic speakers and persuasive orators. Read his work.

## The Importance of **OUTDOOR** Education

There is not always agreement on whether outdoor education is valuable. Some argue that taking students outdoors takes them out of a proper learning environment, reducing the efficiency with which they can learn. Citing studies that show that students who take lessons outdoors perform better on a variety of cognitive tasks, others argue that leaving the classroom has significant scholastic benefits.

In reality, outdoor offers great potential for learning, but the context and details of the education tend to determine how effective it is. Because traditional learning occurs in the classroom, the majority of education takes place indoors. For this reason, people tend to remember any classes that occur outdoors. Memory is of course an important aspect of learning.

However, simply remembering an outdoor excursion is not the same as having learned something relevant to a curriculum. Thus, pairing an outdoor experience with a well thought out lesson is likely the best way to improve student learning. David J. Lockett M.Ed. STEM Teacher Bok Academy, Florida

A number of factors impact the quality of an outdoor education experience. Context is one important component of meaningful outdoor learning. To get the most out of outdoor education, students should be briefed beforehand and do preparatory work in the classroom. Similarly, they should do followup work after the exercise to ensure that the content is put into context and that the information is solidified. These procedures will also improve memory of the outdoor lesson.



Outdoor education can leverage the finding that individuals have different learning styles. While teachers can provide different levels of structure both in and out of the classroom, encouraging interaction with nature can be a way to reach certain types of learners who may struggle to learn passively indoors. Despite the potential for outdoor classes to raise some new issues, the opportunity to successfully teach students new material and to increase their enjoyment of learning is great. When fieldwork is thoughtfully planned and carefully implemented, it can lead to significant benefits. For those who want to run outdoor education, carefully tracking what works and what does not work can also help to optimize the outdoor education program and ensure that students get the most out of the experience.





### Benefits of Outdoor Class Experiences

### 1. It builds community.

From the homeroom to the groups sharing cabins, to the field study, groups that rotate through activities, students will live and work in teams that they wouldn't form on their own.

### 2. It raises expectations and standards.

Students are immersed in a fieldscience activity that asks them to be multi-disciplinary participants drawing on prior knowledge to interact with a variety of environments, weather, and physical challenges of their environment.

### 3. It increases connection.

Watching a group of fifth-grade boys prepare a meal for their class can be an amazing experience. They get into the details about everything -- silverware, enough plates, drinks....and more. Who's going outside to find fresh wildflowers for the table decorations? Did you wash your hands again? All of these become relevant and viable questions along with the curriculum of the off campus experience. They're connected to the process of being a community, and they feel an increased connection.

### 4. It builds culture.

Cultures share a common language, values, purpose, and connection to place as a fundamental expression of who they are. All of these things develop for a group of students in a different class element. Ask ten students and some themes will begin to arise about their outdoor class time. Being outside, having fun, and great and different experience -- all hallmarks of developed cultures.

# 5. It develops positive feelings and memories around school and the out-doors.

Students are asked about their favorite middle-school experience in an open-ended survey question. Consistently, over 50 percent talk about Outdoor school experiences as a high point of their middle school years. They can tell you where they went, some fun facts, what they were learning about and what the weather was like.

# They want to do it more often as ask why don't we?

Change is good and as it happens.... inevitable in life. Why not start in school and teach students to embrace change and find that "sweet spot" of learning that captured their interest in a subject.



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