STEM MAGAZINE

15 Years in Space
NASA Marks ISS Anniversary

Student Decryption Contest *Inside*

Understanding Computer Science

January 2016
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STEM Innovations

A Math and Science Partnership Initiative in Northwest Indiana

Dear Educators,

Happy New Year and those of us at CAN wish all of you the best in 2016!

2015 was an exciting year for STEM Innovations. Our design team and presenters wrapped up the professional development sessions for Cohort 1 teachers. Cohort 2 teachers created their own STEM challenge based on their school's curriculum and standards during the August institute.

Lesson Study Opportunity: Dr. Hoyda has worked with the administrative leads of the STEM Innovations grant to develop a lesson study opportunity for teachers who have participated in the professional development. At this time, Crown Point has volunteered to participate in a lesson study and several other school districts have expressed interest as well.

STEM Innovations Evaluations: Brandon Sorge, from SERI, continues to evaluate the program as required by the grant. His recent work will be to view videos of several teachers implementing their STEM Challenge lessons. This is for the purpose of the grant and is not part of teacher evaluation.

IMPORTANT DATES: Please save the following dates for the upcoming STEM Innovations professional development sessions for Cohort 2 teachers: ***February 8, 2016 and April 13, 2016***

PROFESSIONAL DEVELOPMENT OPPORTUNITY: The Hoosier Association of Science Teachers, Inc. (HASTI) Annual Conference is February 4th-5th at the Indiana Convention Center in Indianapolis. As a teacher who participated in the week-long STEM Innovations Professional Development, in either June of 2014 or August of 2015, the STEM Innovations grant can sponsor your attendance at the HASTI conference for *one day*. The STEM Innovations program will pay for a substitute teacher, the conference registration fee, and the mileage to and from the conference for one of these two days. There is no reimbursement for meals through the grant. Please contact your district's lead MSP administrator as soon as possible if you are interested in attending. Your district lead will determine which teachers will be allowed to attend. Teachers who are selected will complete the registration process as per their district guidelines.

Teachers who attend will have some responsibilities which, if fulfilled, will result in professional growth points and a stipend. Teachers will need to record which sessions they attended at the conference and can also earn a $50 stipend by completing a STEM Curriculum Integration assignment and submitting it to Steven Smith via email at mrsmith@purdue.edu or via the STEM Innovations Learning Connection community. Once the registration process is underway, and the teachers have been selected, the assignment and its due date will be sent to the administrative leads and the participating teachers.

We wish you continued success in 2016!

Your STEM Innovations Team

MERRILLVILLE COMMUNITY SCHOOL CORPORATION

School City of Hammond · GCSC · MSD of Boone Township · School Town of Munster · College Acceleration Network · Purdue University North Central

STEM Magazine is a non-profit monthly education publication for teachers, students, their parents and administrators. CEO Wayne Carley is the publisher and senior editor for all content in S.T.E.M. Magazine.

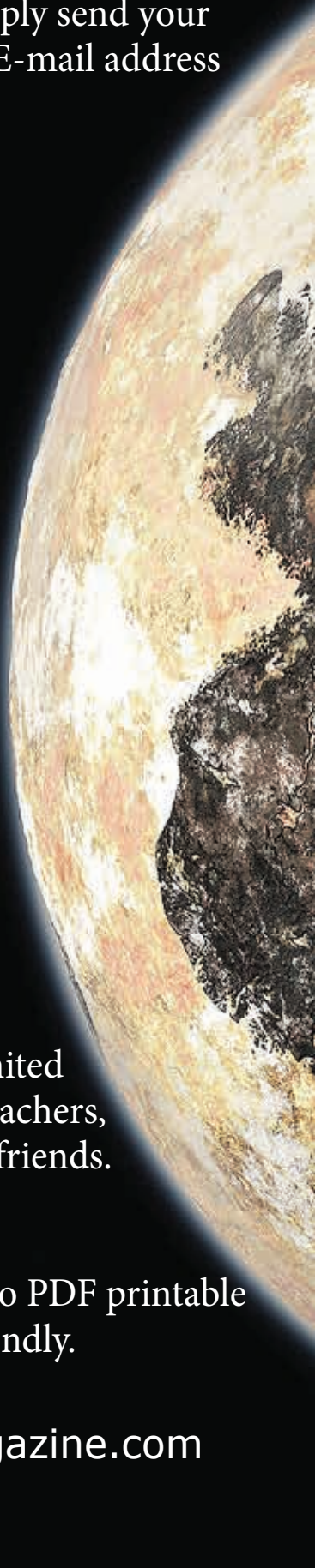
We believe that the key to success in seeing higher graduation rates, improved testing results, student inspiration, creativity, excitement and career satisfaction rest in the hands of the teacher. The example and inspiration of individual educators carries tremendous weight on a daily basis, greatly impacting the quality and effectiveness of the classroom environment.

Our mission: Encourage curiosity, inspiration and creativity, the foundations of every career passion.

Wayne Carley
Publisher
STEM Magazine

School, district, county and state subscriptions are available.

To find out more, simply send your E-mail request to the E-mail address below.



You would have unlimited distribution to your teachers, students, parents and friends.

STEM Magazine is also PDF printable and mobile device friendly.

wayne@stemmagazine.com

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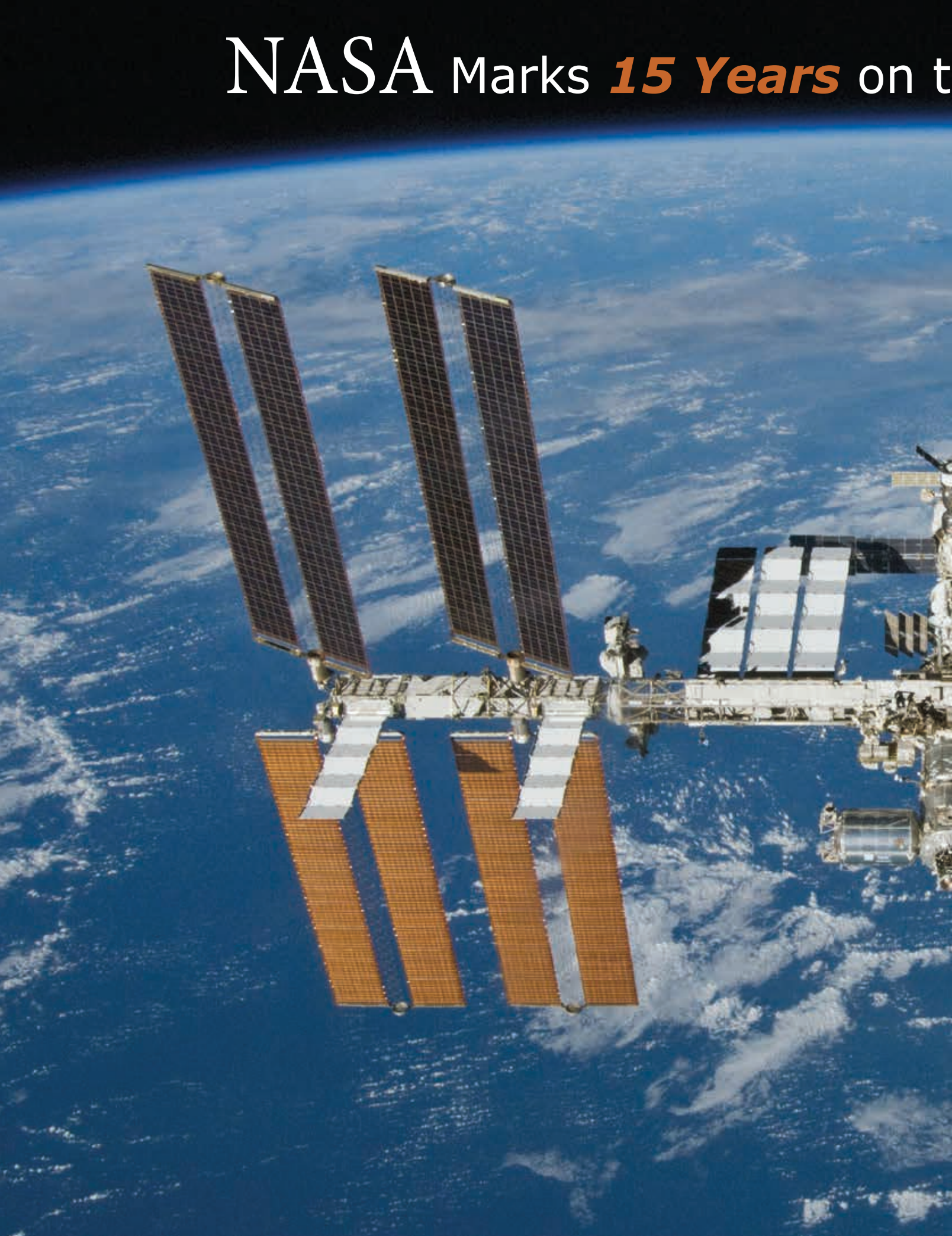
Use it in class. Use the smart board.

There are several student and teacher activities in each issue that are appropriate for all grades and all teachers in all subjects.

Curiosity and learning are ageless.

Please enjoy this issue. You have unlimited distribution, so your students and their families may enjoy it too.

NASA Marks *15 Years* on t



he International Space Station

by Tracy McMahan
NASA

Astronauts have been living in space on an orbiting laboratory longer than many high school students have been alive. This month marks 15 years of continuous human presence on the International Space Station.

When the first crew docked with the station for Expedition 1, the science control center at NASA's Marshall Space Flight Center in Huntsville, Alabama, was staffed and ready to support the first science experiments. Back then, a smaller station and a crew of only three people meant a minor team on the ground compared to today. Figuring out how to support science around-the-clock and create the control room required late nights and a new way of thinking.

This eventually paid off with the creation of the space station's Payload Operation Integration Center (POIC) -- NASA's science command post that started operating around the clock, 365 days a year in March 2001.

"We took on a monumental and fulfilling task," said Lybrease Woodard, deputy director of the Mission Operations Laboratory and one of the

*NASA Astronaut **Steve Bowen,** STS-132 mission specialist*

original payload operations directors for the POIC. "We had staffed consoles and helped monitor 24-hour-a-day science during Spacelab and space shuttle missions, but those rarely lasted longer than three months at the most.

This was going to be science output 24 hours every day for the foreseeable future, with no breaks. This

exponential growth was long-term planning at its finest, and we had the right team to make it happen." Drawing from the tremendous amount of experience gained during Spacelab science missions on NASA's space shuttle, the science operations team at Marshall led the way through thousands of hours of planning to establish how science operations could be supported around the clock.

They learned the best methods for helping astronauts in orbit required extensive advance planning, and operations have been streamlined as they have worked with crews on 45 expeditions.

"We had to create numerous processes," said Lewis Wooten, director of the Mission Operations Laboratory, the Marshall engineering lab that manages the science center operations. "We needed to determine the best way not only to train and inform astronauts in orbit about the dozens of experiments they could be juggling on any given day but also to inform the controllers on the ground as well. We found the right people and learned how to certify them for flight support."

One of the key positions is the Payload Operations Director, or POD. This person coordinates everything happening with space station science in the control room and is part of the Flight Director's team in the Mission Control Center at NASA's Johnson Space Center in Houston. More than 40 payload operations directors have supported crews in space since 2000.

European Astronaut
Samantha Cristoforetti

"I was on console in Huntsville for the launch of the first expedition, and it was amazing," said Pat Patterson, the only person who has worked as a payload operations director for all 45 space station expeditions in the last 15 years. "I didn't realize how different it would be from those Spacelab days and how much we would accomplish.

The station has grown from three science racks to 18. But what I love most is seeing the space station community shift focus from the vehicle to the science. I think we'll see great things in the future."

This team has helped the crew conduct more than 1,700 experiments from 83 countries around the world, and many are already returning benefits for humanity as well as helping NASA prepare for missions even farther away from Earth. Putting this infrastructure in place gave the agency a secondary benefit because it serves as a back-up location for space station Mission Control.

“I was the Backup Control Center lead engineer for Marshall in 2006 when we started the project,” said Joseph Pirani, now deputy chief of the Mission Operations Systems Branch at Marshall. “It took two years to build the infrastructure, complete the documentation and training to learn how the flight controllers in Houston operate and interact with the crew in orbit.

One month after we were certified as the Backup Control Center, Hurricane Ike hit the Gulf Coast of Texas, forcing the mission control workforce to evacuate to work from the new back-up facility in Huntsville. I was very proud of our team for their poise and support to our displaced visitors.

It was amazing to have our two teams -- space station operations and science -- in control rooms right next to each other.” Besides the professional satisfaction of working on life-changing science with a crew of people orbiting the planet, there has been the occasional personal highlights.

It was late in the day in June 2005 when the work phone rang in front of Payload Communicator Lisa Mavrotheris. "When I picked up the receiver, there was a delay from the person on the other end," recalls Mavrotheris, a veteran of the POIC who is now training to be a simulation supervisor. "I nearly hung up because I was busy on console and wasn't inclined to give that person much time to speak up.

It turns out it was astronaut John Phillips calling me from orbit! He had heard my son was entering the U.S. Navy and, being a Navy veteran himself, called to wish him well on his new venture.

"His kind gesture meant a lot to both of us, and now my son is in training to be a Payload Rack Officer here. I'm so glad I didn't hang up the phone!"

More information about the International Space Station's 15 years in orbit can be found online at a special 15th anniversary website.

NASA astronaut ***Karen Nyberg***

Your future awaits.....if you *dare to dream.*
Astronaut...out of this world STEM career.

UNDERSTANDING COMPUTER SCIENCE

A survey by Google and Gallop Polling

Computer science; noun
1. the science that deals with the theory and methods of processing information in digital computers, the design of computer hardware and software, and the applications of computers.

Science; noun
2. The systematic accumulation of knowledge.
4. systematized knowledge in general.

Even Webster's Dictionary falls short of the "best complete" understanding and definition of computer science in the 21st century.

Many students, parents, teachers and school administrators do not properly distinguish between computer science activities and general computer literacy. It's important for students to understand the breadth of computer science and the value of computer science skills so they can make informed decisions about whether to learn. It's equally important for school leaders to understand what constitutes computer science as they try to engage students in developing these foundational skills.

"Computer Science is differ

Courses that administrators consider to be computer science often lack programming/coding – a key element of computer science, as discussed in our first report observations from students and parents suggest that TV and film media portrayals, as well as personal perceptions among students, parents and educators, often reflect stereo-

rent that computer literacy”

types about people who engage in computer science; this has the potential to limit participation among certain student groups.

Students and parents perceive that there are few portrayals of women, Hispanic or Black computer scientists on TV or in movies. These groups are much more likely to see White or Asian men engaged in computer science. They also often see computer scientists portrayed wearing glasses.

Students, parents and teachers are more likely to say boys are more interested in learning computer science than girls, and that boys are more likely to be successful in their learning. Hispanic parents are less likely than Black and White parents to share this view. In fact, a larger percentage of Hispanic parents say girls (39%) are more likely than boys (29%) to be successful at learning computer science.

About half of all students say they’ve learned some computer science, either in school or somewhere else. However, students who are Hispanic, female or from lower-income households are less likely than their counterparts to have learned any computer science. Male students are generally more confident in their ability to learn computer science and are more likely to think they will learn computer science or have a job involving computer science in the future. Hispanic students are generally less confident than Black and White students in their ability to learn computer science. Students who are more confident in their ability

to learn computer science are also more likely to say they will learn it in the future.

Computer science careers are viewed favorably by many students, parents, teachers and administrators in the U.S. Most students, parents and teachers perceive computer science work to be fun and exciting, and most students, parents and principals say people who work in computer science make things that help improve people's lives. All groups also believe computer science can be used in many different types of jobs. Two-thirds of students and 79% of parents further agree that most people who work in computer science have good-paying jobs.

Although more than six in ten in every group think that most computer science jobs pay well, Hispanic students and female students are less likely than their counterparts to believe this. Parents in lower-income households and teachers at schools with a greater percentage of free- or reduced-lunch-eligible students are most likely to value formal computer science education. Parents in lower-income households are most likely to think computer science learning opportunities are more important to a student's future success than required classes, such as math, science, history and English. Teachers in schools with a larger percentage of students eligible for free or reduced lunch are more likely than other teachers to think computer science learning opportunities are more important to a student's future success than other elective courses, but their schools are less likely to have computer science available. Among all teachers, three in four also say they would be interested in learning more about computer science if given the opportunity.

It's interesting that polling shows that the higher up the education ladder you go, from classroom teacher to principal to superintendent, the less important and necessary computer science in the lives of our children is.

The widespread support for computer science learning from all stakeholder groups is encouraging.

However, inequitable access to learning opportunities and ingrained stereotypes may hinder some students from participating, particularly females and underrepresented racial and ethnic minorities. Broadening computer science role models, as well as creating accessible learning opportunities that appeal to diverse youth, could help increase participation.

Equally important is ensuring that all groups have a common understanding of what computer science is and how it can help students become better-informed consumers of technology.

NATIONAL SECURITY

Encrypt [en-kript]

verb (used with object)
1. to encipher or encode.

Encryption, is the process of changing information in such a way as to make it unreadable by anyone except those possessing special knowledge (usually referred to as a "key") that allows them to change the information back to its original, readable form.

Encryption is important because it allows you to securely protect data that you don't want anyone else to have access to. Businesses use it to protect corporate secrets, governments use it to secure classified information, and many individuals use it to protect personal information to guard against things like identity theft.

Espionage uses encryption to securely protect folder contents, which could contain emails, chat histories, tax information, credit card numbers, or any other sensitive information. This way, even if your computer is stolen that data is safe.

So many threats... so many fixes. What does what? What works? What's hype? And, why do I need encryption?

At the very base of any good security toolbox are firewalls, anti-virus, anti-spyware, and encryption. It is highly recommended to have all four before connecting to the Internet.

Firewalls, anti-virus, and anti-spyware work at the threat level to block invasion to your hardware and software. The problem remains that new malware is multiplying so rapidly, these defenses can't always keep up.

Encryption takes over here. It works at the source of what invaders want from you - your data. Encryption changes the data so that it can't be read. Even if intruders drive down the defenses and capture the data, it is useless to them. Encryption is also necessary to ensure ironclad data as it travels around the Internet and is transported by laptop or portable device.

Class Assignment
$25 Reward from STEM Magazine

The link below will lead you to your Decryption assignment. It may not be easy, but if you work together and use your imagination, you can do it. The first school class who calls me at 1-478-319-7177 (you can leave a message) with the correct *"message"* will receive a **$25 gift card** for their class supply needs....hopefully a software item or book on the subject. You will also be mentioned in the February issue.

CLICK HERE FOR THE ENCRYPTED MESSAGE TO BREAK

Lesson Study and Lesson Sharing:

An Appealing Marriage

Dr. Richard Larson MIT

Lesson study and lesson sharing are two educational initiatives that, if merged, have the potential to revolutionize how teachers plan and deliver lessons. Lesson study is the joint production of lessons by a small team of teachers over the course of a few months. The resulting lesson plan is usually "on paper" and used only locally. Lesson sharing occurs on the Internet, providing contributing teachers with a mechanism for sharing their lessons with others.

Typically a single teacher authors these shared lessons. We discuss the advantages and associated implementation barriers of each when viewed as separate activities, and then argue for their joint or merged implementation, describing how each would synergistically support the other.

Not only would more vetted lessons be delivered to the Internet, but also the teacher teams participating in lesson creation would develop a much deeper understanding of pedagogy. We offer policy recommendations to support this new educational paradigm: A virtual marriage of lesson study and lesson sharing.

1. Education as a Craft Industry

Today's dissatisfaction with elementary and secondary school education is not unique. The publics perception of the problem and required solutions seems, over decades, to be almost cyclical in nature. Our story here begins with American schools in the mid-to-late 19th century.

The schools were under public pressure to move away from emphasis on rote learning and toward student-centered learning techniques.

Many Americans had taken an interest in the ideas of German-born Johann Pestalozzi, who envisaged that schools should be "creating situations in which students learned from their own experiences, rather than from the authority of the textbook and the school teacher" (Rillero, 1993).

Notably, much recent pedagogical research supports such an approach. But in the 19th century such hands-on lessons were difficult for many teachers to implement effectively and, as such, early attempts at introducing Pestalozzian teaching failed until educators began concentrating on teacher training in the form of focused teacher professional development (PD). Edward Sheldon of the Oswego (New York) Primary Teachers' Training School operated the most notable Pestalozzian teacher-training program, where Lesson Plan development, pre-service internships, and numerous other hallmarks of effective teacher training were first introduced (Rillero, 1993).

The graduates of this program spread across the country and had individual successes. But problems emerged when the techniques were attempted at scale, with the majority of teachers never having participated directly in the Oswego program and hence unprepared.

Apparently, the Oswego graduates were not successful as trainers and had not been trained to train others. The many insufficiently trained teachers became overwhelmed, threw in the towel, and Pestalozzi's message was diluted and lost. Lesson Plans became scripts, exploratory lessons became lectures on what students should understand from experiments, and teachers moved back toward rote memorization.

A key lesson here: Do not underestimate the value of teacher training. The daily routines of teachers have remained roughly the same since these 19th-century efforts, even as new educational theories have come and gone over the decades. Teachers in isolation, working late into the night, produce homemade lessons to teach the next day (Figure 1). In essence, education remains a craft industry, with each classroom a "site of small scale industrial production often involving hand work and craft skills" ("Building Types Thesaurus").

However, over the last century most other service industries have been aided by technological advancements, allowing workers to become more productive (Larson, 2009; Larson, 2011).

For instance, ATM's have removed the need for routine dispensing of money by bank tellers, allowing banks to focus more on addressing customer problems and selling other financial products. With the exception of many promising exploratory efforts, some of which we will discuss, in-class education remains relatively unchanged by technology. We present two educational initiatives that show promise for revolutionizing particular aspects of the education system.

The first, lesson study, can break the isolation of teachers via its collaborative lesson planning process.

The second, lesson sharing (usually via the Internet), can move teachers away from an isolated craft industry environment by offering high-quality, vetted lessons so teachers can focus less on lesson planning and more on helping students individually. While each of these initiatives has shown promise, we believe their co-implementation could be a classic case of 1 + 1 = 3, that is, **synergism.**

(syn·er·gy)

the interaction or cooperation of two or more *organizations*, *substances*, or *other agents* to produce a combined effect *greater than the sum* of their separate effects.

The term synergy comes from the Greek word synergia συνέργια *from synergos,* συνεργός, *meaning* ***"working together"***

Exploring the Need for DIVERSITY in **STEM**

Wayne Carley
Publisher, STEM Magazine

"Innovations resulting from science, technology, engineering and mathematics (STEM) fields have positively touched nearly every aspect of human life."

Kenneth Gibbs, Jr. National Institute of General Medical Sciences

Innovations of all shapes and sizes are born in the imagination. Some of those day dreams end that day, while others take the next steps to investigation, creativity, and soon reality. Every innovation, regardless of the career field or application is built from each of the STEM disciplines, highlighting the need for the broad range of STEM skill sets in harmony.

Every subject, view, definition or interpretation is fraught with disagreement, opinion and alternate position. Diversity as a concept is no different. Some question the need for diversity thinking it to be a political, racial, or gender imbalance that must be addressed just for the sake of someone's opinion of equality for the sake of equality. Though that could be true in a few cases, diversity in STEM is a bit more complicated, yet simple at the same time.

Ninety one percent of nurses are women, so does this attitude suggest we need more men nurses? It just so happens, the number of men nurses is growing slowing over the last decade.

The vast majority of plumbers are men. Do we need more women plumbers? Why?

Both of these are great STEM careers with a vast variety of educational and financial opportunities. Is there a shortage in either of these fields? If so, who should be persuaded to fill the void? Maybe the answer is "whomever is interested in filling them", regardless of gender, race, age, or other diverse background.

Do what you love. We hear that suggestion uttered regularly and it makes sense on many levels. Let's say there is a shortage of plumbers;

"..But I don't want to be a plumber. Please don't make me or push me in that direction. I want to be a fireman."

What is diversity?

One challenge is different definitions of what diversity is? It may lack a single , specific definition with the variety of contexts available. Diversity is often used as the antonym of heterosexual, able-bodied, middle-class-to-wealthy white male. We would be mistaken.

The New Oxford American Dictionary gives us this definition:

diversity | noun: (a) the state of being diverse; variety: there was considerable diversity in the style of the reports. (b) a range of different things: newspapers were obliged to allow a diversity of views to be printed.

Add to that gender differences that may include being more patient, less confrontational, open-minded, emotional sensitivity...and the list goes on. Race too may play a contributing part in ways your racial experience is not aware of. Culture, socioeconomic background, maturity, how you were raised....all very diverse attributes that have value.

Some would say that diversity is "only" a property of groups, not individuals, but here again, as we put it in context and definition, that may not be accurate. I am very diverse or different within myself, able to have multiple opinions on the same topic, a variety of thoughts on several scientific theories, numerous simultaneous creative visions to solve

Diversity refers to differences.

Differences are a good thing most of the time. Group brainstorming or team learning are good examples to find the solution to a problem. Each member of that group may have a very different life experience, intellectual familiarity with the topic, personal interest in it, creative or scientific tendencies; all contributing greatly.

problems based in part to my life experiences. Having had 3 distinctive and unrelated careers in my life to date, as well as living abroad for 12 of those years in very "different" cultures, I am "very different" when you breakdown my life.

There are many dimensions of differences (thus, some of the confusion about what diversity means). These may include, race/ethnicity, gender, disability status, nationality, religious affiliation, sexual orientation and socioeconomic background. Every person possesses multiple, intersecting social identities.

For some dimensions of social difference (e.g., nationality), the scientific enterprise has a considerable degree of diversity. In other ways, the scientific enterprise lacks diversity–especially as it relates the participation of women, certain minority groups, and people with disabilities.

A- Diversity is absolutely necessary for excellence

Why do we need more women in certain career fields? Just by being women, they bring unique qualities to the table that directly impact the creativity, process, imagination and ultimate success of the endeavor. The same potential contributions will come from other races, age groups, those with varying values, life experiences and cultural exposure. Someday, we'll all just be human beings.

Problem solving progress often results from diverse perspectives. That is, the ability to see the problem differently, not simply "being smart". Therefore diversity is not distinct from enhancing overall quality–it is critical to achieving it. These differences can bring new perspectives needed to promote innovation.

B- Lack of diversity = A Loss of Talent

There are continued imbalances globally in the racial, ethnic, gender, and financial compensation representation across traditional STEM fields. In some countries today, women are still not permitted to even drive, much less be innovators. The obvious loss of "different talents" that reside in the variety of groups can only result in a lack of imagination, innovation, creativity and perspective as it applies to the task or problem to be solved.

Francis Collins, director of the National Institutes of Health, has said, "Chronic and woeful underrepresentation in the workforce leads to the inescapable conclusion that we are missing critical contributors to our talent pool."

C- Improving diversity is critical to long-term national and global economic growth.

Long-term economic growth relies on having a capable workforce. While there's no evidence of widespread shortages in scientific talent today, contrary to what you may have heard, there are reasons to be concerned about America's ability to cultivate adequate STEM skilled talent in the coming generations. Most children born in America today are non-white, and half of all children born are female. The continued underrepresentation of minorities and women in a variety of career fields represents a challenge to the United States' ability to cultivate an adequate, domestic workforce.

Conclusions

Diversity refers to difference. The world population has much to offer in diversity that leads to better problem-solving. Fifty six percent of Silicon Valley tech. jobs are held by Asians, both American born and immigrants. Where does most of America's technology innovation come from? ....that's right.

With the conclusion of the Space Shuttle program, a good example of this diversity and global cooperation is the International Space Station. No doubt this conversation will continue.

OUT OF MY MIND

Reflections on Lab Safety

By James A. Kaufman, Ph.D.

The Acceptable Number?

I was thinking the other day about William Lowrence. He wrote the book, Of Acceptable Risk. Lowrence said that safety is a judgment about the acceptability of risk.

This got me to wondering about what's really acceptable. How many deaths and permanently crippling injuries? How much pain and suffering and property damage?

If the risk is really small, does that

make it acceptable? And, if so, to whom? The family that has suffered the loss, the school, the community, society? If you are a school science teacher, how many children dying in your classroom in a thirty year career is acceptable? How about in your school, in your town, in your state, in our nation? What's acceptable?

Last March, in Tulsa, Oklahoma a student was rushed to the hospital to have his thumb reattached after a school science experiment exploded. I'm told that the teacher was grinding a mixture of potassium perchlorate and sulfur in a mortar and pestle. By one account, the teacher was having trouble grinding the mixture so a student was asked to help. Acceptable?

What about at colleges and universities? Last year, there were fires at UC Irvine, UC San Diego, and UC Santa Cruz. Millions of dollars of property damage resulted. Acceptable?

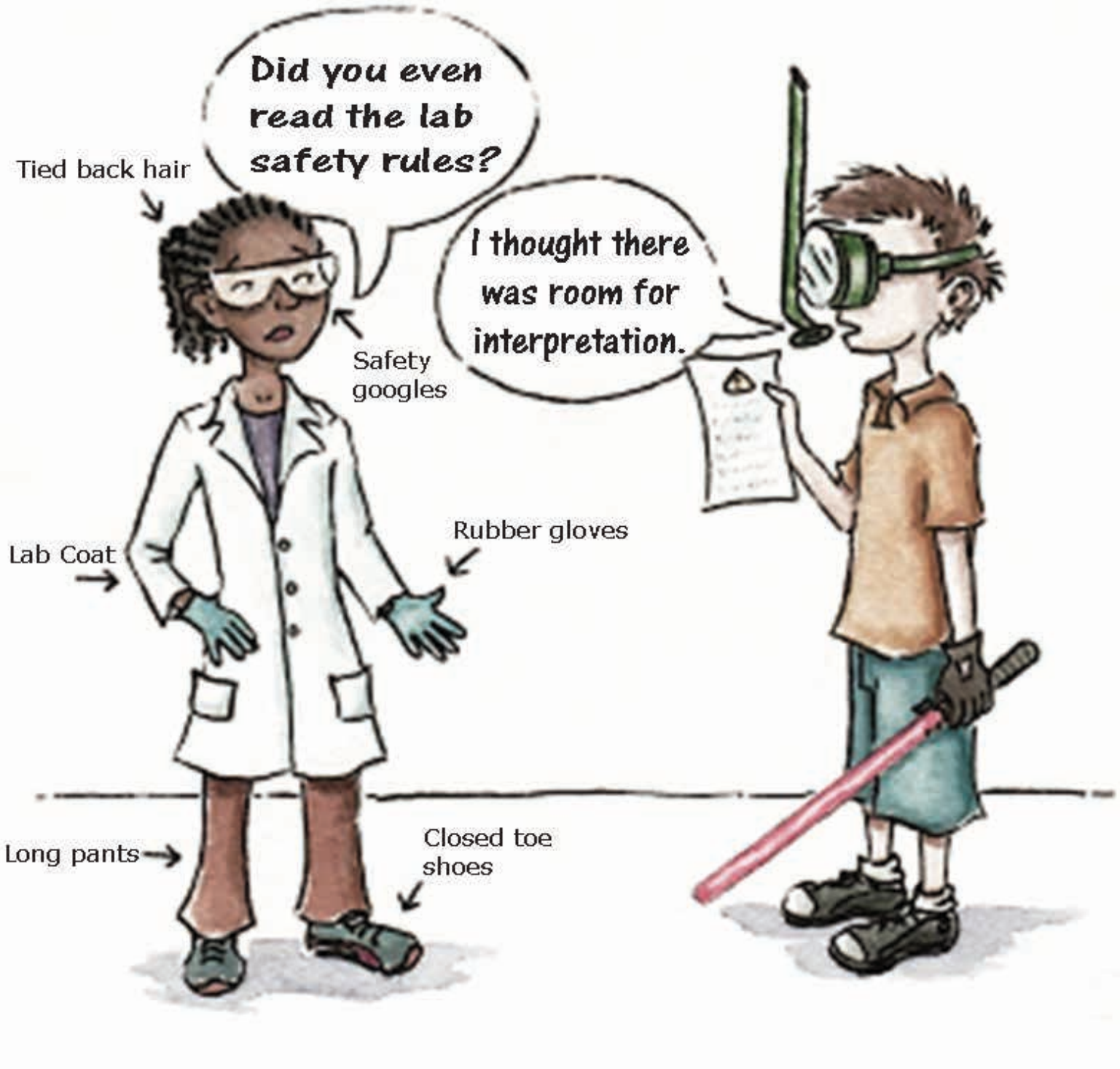
There's no such thing as risk free living. Life is full of hazards. You can't cross the street without taking some risk. How much risk should be acceptable for a school, college, or university science lab? What about graduate school?

Since 1974, there have been at least a dozen fatalities in school, college, and university science programs. How do you explain to the parents of a child that was electrocuted that you didn't have a $15.00 ground fault circuit interrupter? Do you tell them it costs too much?

Speaking of acceptable, on a slightly different note, what about repeated violations of EPA hazardous waste violations? How many times does a science department, the principal investigators, post-docs and graduate students need to be warned before they should pay the EPA fine personally?

Imagine that your institution sent you to a professional conference. On the way, you got a speeding ticket. While there you got a parking ticket and your car was towed. When you got back, would you ask the Principal or the Dean to pay the fines? Of course not.

You need to be responsible.


Did you even read the lab safety rules?
I thought there was room for interpretation.
Tied back hair
Safety googles
Rubber gloves
Lab Coat
Long pants
Closed toe shoes

American Students:

SMART PHONE EXPERTS WHO STRU

GGLE IN READING AND MATH

Richard Freed
Psychologist, author, and speaker on child technology

American teens' increasing access to smartphones is driving a meteoric rise in their entertainment tech use. The recently released Common Sense media report shows that teens now spend an incredible ***6 hours and 40 minutes each day*** using video games, online videos, social media, and other screen self-amusements. Not counted in this total is the tremendous amount of time teens spend texting and talking on their phones. As our adolescents' lives become increasingly dominated by digital entertainment, ***what are the consequences?***

An answer is found in another recently released report on U.S. teens: the 2015 National Assessment of Educational Progress (NAEP), also known as the Nation's Report Card. This study reveals that 8th grade students' scores in reading and math dropped from the last time they were measured in 2013. A disturbing two-thirds of American 8th graders now score "below proficient" in reading, and this same percentage of students score "below proficient" in math.

Even before this recent drop, American students were struggling against their global competition. The latest Program for International Student Assessment (PISA) scores from 2012 show that American 15-year-olds rank 30th in math, 23rd in science, and 20th in reading compared to students from other countries that took the exam. This should be cause for alarm, as

American school children must now compete with students from around the world for college admission and jobs.

Why Our Teens Are Falling Behind

Is the dramatic increase in teen smart phone and entertainment tech use contributing to their academic struggles? It's not the only factor, but it's a critical one. Smartphones provide teens 24/7 access to playtime technologies that research shows drag down their academic success. According to the Kaiser Family Foundation: "The transformation of the cell phone into a media content delivery platform [has] facilitated an explosion in [entertainment] media consumption among American youth," especially TV and video games.

It's these high levels of TV, video games, and other entertainment technologies which ***displace*** teens' focus on school and hurt their academic performance.

What's confusing for parents is that they are told the latest technologies give students a learning advantage. Unfortunately, what's little mentioned is that our kids use their gadgets almost exclusively to play around. As noted by the Kaiser Family Foundation, while kids spend 8 hours a day playing with entertainment screens and texting and talking on the phone, ***they only spend 16 minutes a day using the computer at home for school.***

What these kids don't realize is that a college education is remarkably important today, and that colleges gauge admission based upon teens' grasp of school-taught fundamentals, including reading, math, and science.

Who Is Most Hurt by Tech Overuse?

I work with teens from all walks of life whose chances of academic success are spoiled by their overuse of digital technologies. But it's kids of color and those from low-income families who are disproportionately affected. The new Common Sense media report found that Black teens average 8 hours and 26 minutes per day with entertainment screen technologies as compared with 6 hours and 18 minutes for White teens.

"What's confusing for parents is that they are told the latest technologies give students a learning advantage. Unfortunately, what's little mentioned is that our kids use their gadgets almost exclusively to play around."

The negative impact of heavy teen smart phone use on academics is clear in my work as a child and adolescent psychologist. When I ask teens to describe their afterschool schedules, they often say, "Oh, I come home from school, grab a snack, and then I'm on my phone for most of the night." I ask kids when they study or do homework, "Oh, sometimes late at night... if I have time."

These screen/tech-use differences are a significant factor contributing to racial achievement disparities:

According to the latest Nation's Report Card report, 16% of Black 8th graders are "proficient" in reading as compared with 44% of White students, and 13% of Black 8th graders are "proficient" in math as compared with 43% of White students.

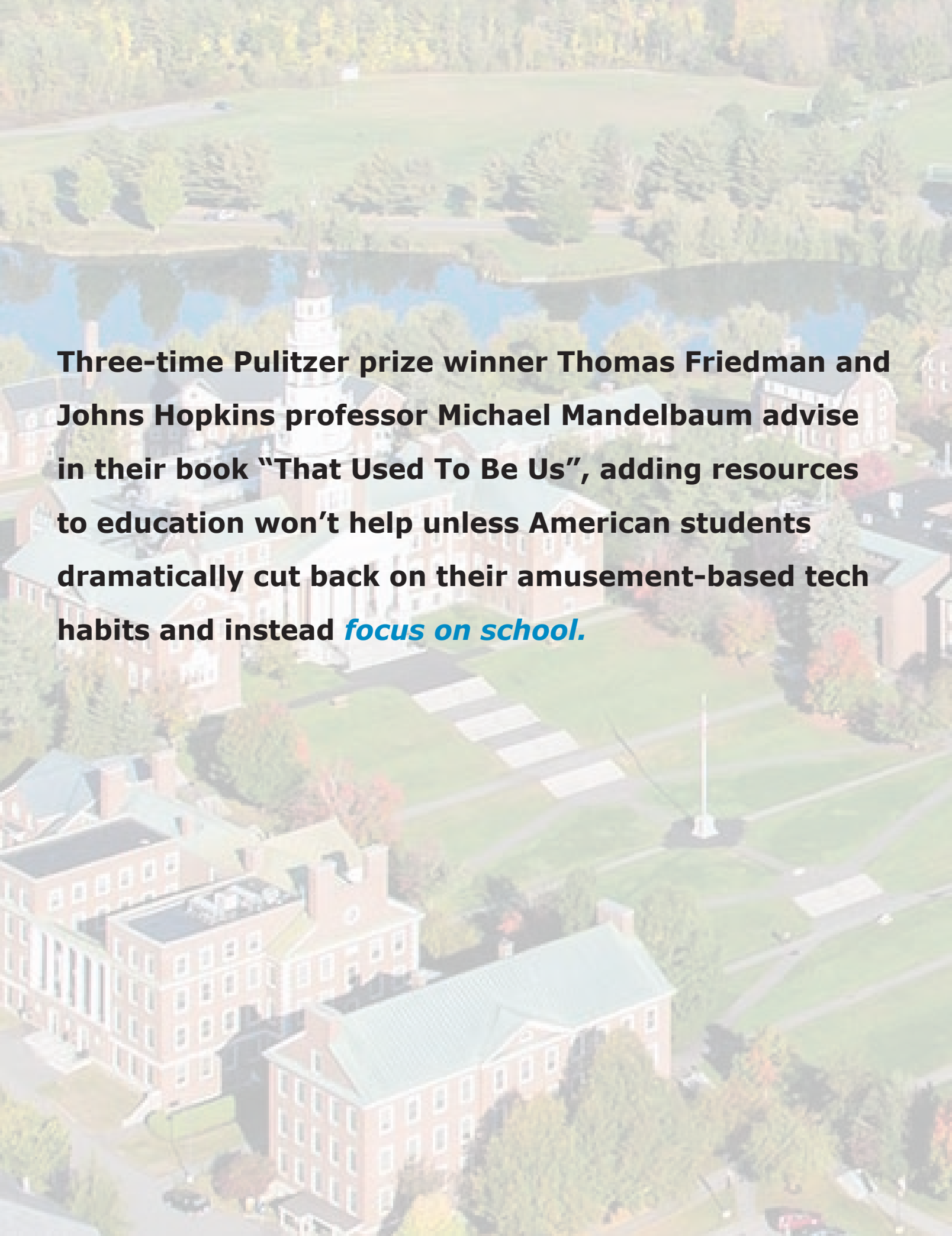
Why do teens of color and kids from low-income families spend a greater amount of time using tech and screens?

Less advantaged parents I work with tell me that they can't afford the extracurricular activities that can keep kids from turning to screens and phones. Also, more affluent families I work with have greater access to high-performing schools, college counselors, and other resources that can help parents understand the importance of limiting screen/phone time in order to foster teens' school success.

How Can We Help Our Teens Achieve Learning Success?

Much of the blame for our teens' learning struggles wrongly falls on schools. I believe we should do all we can to ensure our nation's schools are adequately funded. Yet, as three-time Pulitzer prize winner Thomas Friedman and Johns Hopkins professor Michael Mandelbaum advise in their book That Used To Be Us, adding resources to education won't help unless American students dramatically cut back on their amusement-based tech habits and instead focus on school.

I suggest that schools take a leadership role in helping parents understand that home factors, especially teens' access to screens and phones, play a powerful role in their learning success. At back-to-school nights and other parent-teacher gatherings, schools should help parents realize this basic formula: parents' limits on entertainment technologies will lead kids to receive higher grades and test scores.



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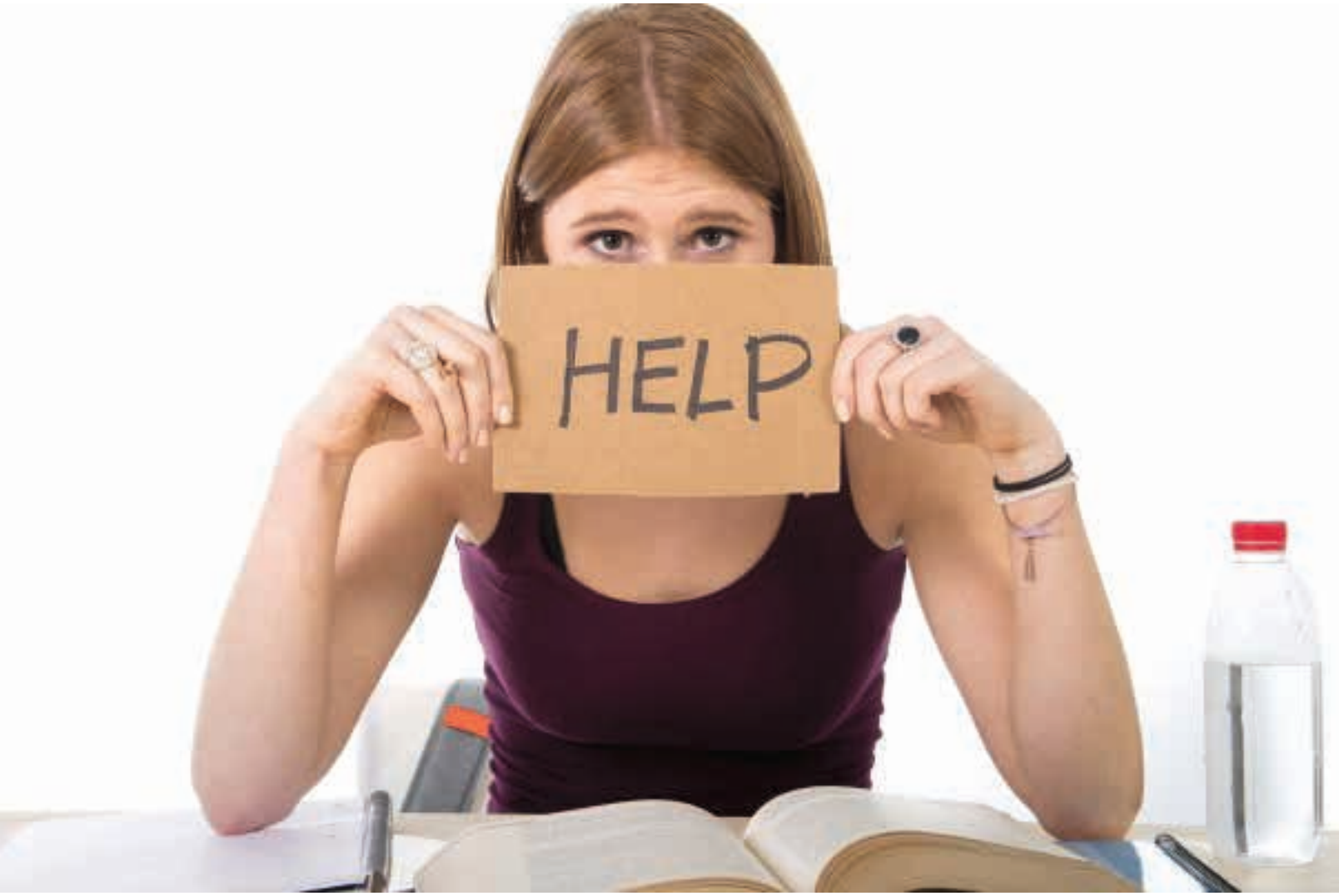
Schools will also help teens by talking directly with them. Teens are just not getting the message that their endless hours spent gaming, social networking, texting, and watching online videos can cost them the goals they have set for themselves, including getting into college.

Families from less advantaged families may need extra support to help kids power down their devices and pick up their schoolbooks.

As a society, we need to do a better job of offering teens quality enrichment experiences, such as after-school screen- and phone-free study sessions, that give teens the space they need to learn and achieve their goals.



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MYTHS about *Rigor* in the classroom

by *Barbara Blackburn*

Despite all the research, there are five myths about rigor that are often heard. Let's look at each, then turn our attention to the true meaning of rigor.

> *Lots of homework is a sign of rigor.*

> *Rigor means doing more.*

> *Rigor is not for everyone.*

> *Providing support means lessening rigor.*

> *Rigor is just one more thing to do.*

1. Lots of homework is a sign of rigor.

For many people the best indicator of rigor is the amount of homework required of students. Some teachers pride themselves on the amount of homework expected of their students, and there are parents who judge teachers by homework quantity.

Realistically, all homework is not equally useful. Some of it is just busywork, assigned by teachers because principals or parents expect it.

For some students, doing more homework in terms of quantity leads to burnout. When that occurs, students are less likely to complete homework, and may be discouraged about any learning activity.

2. Rigor means doing more.

"Doing more" often means doing more low-level activities, frequently repetitions of things already learned. Such narrow and rigid approaches to learning do not define a rigorous classroom. Students learn in many different ways. Just as instruction must vary to meet the individual needs of students, so must homework.

Rigorous and challenging learning experiences will vary with the student. Their design will vary; as will their duration. Ultimately, it is the quality of the assignment that makes a difference in terms of rigor.

3. Rigor is not for everyone.

Often, teachers think the only way to assure success for everyone is to lower standards and lessen rigor.

This may mask a hidden belief that some students can't really learn at high levels. You may have heard of the Pygmalion Effect—students live up to or down to our expectations of them. Each student can complete rigorous work at high levels, whether they are advanced or a student with special needs. Does the end result look different for those two students? Yes, but I know from my own experience as a teacher of struggling

students reading far below their grade level that any teacher can be rigorous, and any student can reach higher levels with the right support.

4. Providing support means lessening rigor.

In America, we believe in rugged individualism. We are to pull ourselves up by our bootstraps and do things on our own. Working in teams or accepting help is often seen as a sign of weakness. Supporting students so that they can learn at high levels is central to the definition of rigor. As teachers design lessons moving students toward more challenging work, they must provide scaffolding to support them as they learn.

5. Rigor is just one more thing to do.

Rigor is not another thing to add to your plate. Instead, rigor is increasing the level of expectation of what you are already doing. For example, if you are teaching vocabulary, instead of asking students to write their own definition of the word, ask them to write a riddle. It's the same end result, but at higher levels of Bloom's Taxonomy.

The Real Meaning of Instructional Rigor

So, what is rigor? Rigor is creating an environment in which each student is expected to learn at high levels, each student is supported so he or she can learn at high levels, and each student demonstrates learning at high levels.

Notice we're looking at several characteristics.

Teachers who are rigorous hold high expectations for every student. In other words, we expect them to learn.

Second, we back up those expectations with support. We provide the appropriate scaffolding and guidance to ensure learning.

Finally, each student demonstrates they understand the material. These are interwoven together to provide a strong environment that, in turn, supports your rigorous standards.

"…..increasing the level of expectation of what you are *already* doing."

Barbara is a best-selling author of 14 books, including "Rigor Is Not A Four-Letter Word". A nationally recognized expert in the areas of rigor and motivation, she collaborates with schools and districts for professional development. Barbara can be reached through her website www.barbarablackburnonline.com.

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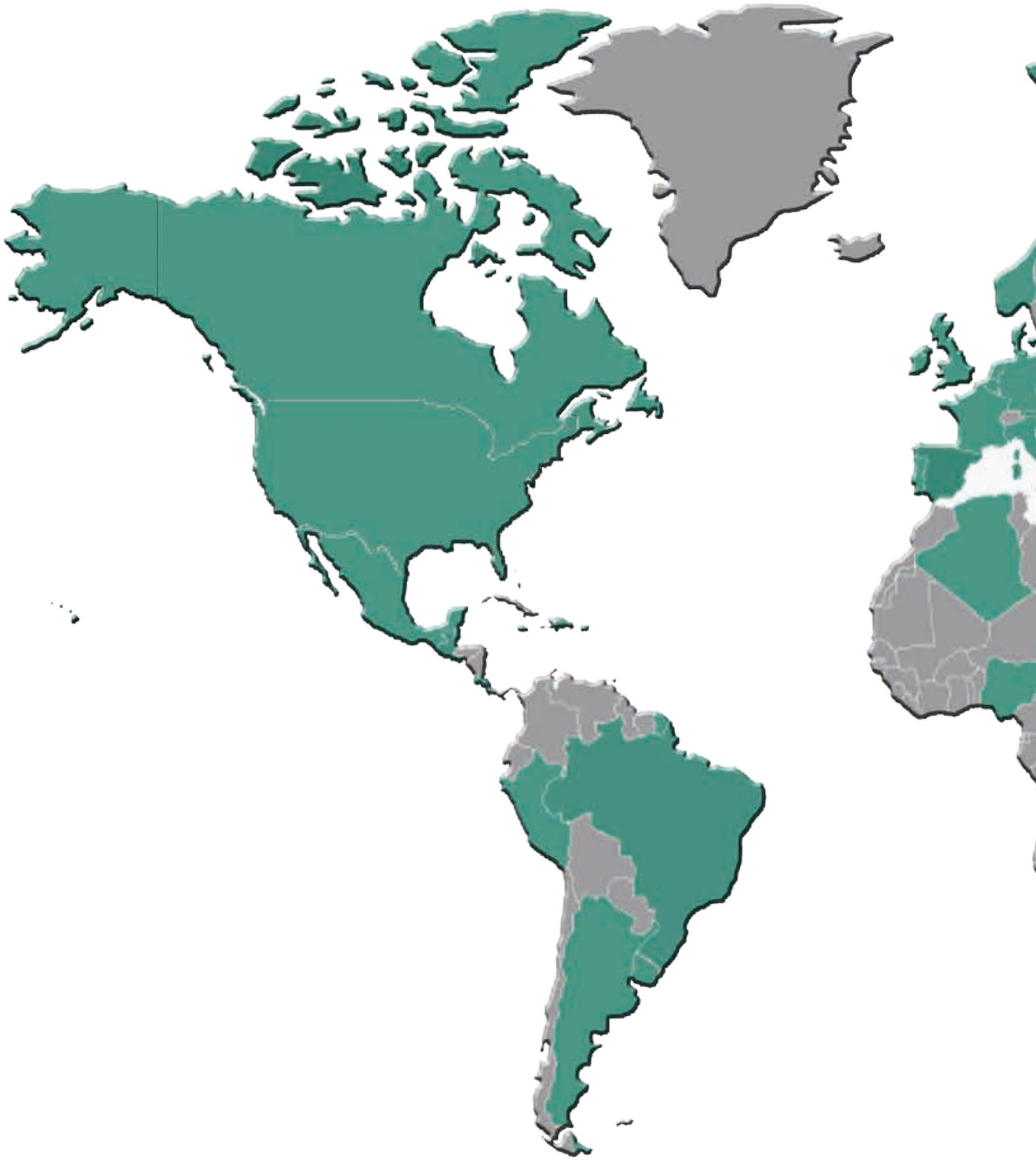

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