



In This Issue:

Investing in Our Future	1
Making a STEM-Pact	1
Mistakes and Mindset	2
1000 Classes and Counting	2
Through the Eyes of History	3
STEM Opportunities	3
Mentoring: Relationships	3
The "E" in STEM	4

Louisiana Lagniappe

INVESTING IN OUR NATION'S FUTURE



**Kathy
"Alpha"
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STARBASE: MAKING A STEM-PACT!



**Laurie
"Deuce"
Ilgenfritz**
Deputy Director

For DoD STARBASE, the past several years have been a period of uncertainty. Congress has had many difficult budget decisions, and STARBASE funding has been one of many expenses hanging in the balance. However, abundant research has underscored the need for an increased focus on STEM in our schools, and our legislators have recognized the critical part STARBASE plays in preparing our youth for a future in STEM. Their commitment to our program has ensured that STARBASE receives the funding to keep our doors open and our mission alive. STARBASE per pupil cost is remarkably low, requiring a relatively small investment while packing a big punch!

STARBASE was doing STEM long before STEM was the trend! The STARBASE program includes 25-hours of exemplary rigorous STEM instruction, cutting-edge technology elements and 21st Century skill development, with a proven track record of improved student performance. In addition, STARBASE Louisiana's 2.0 middle school program provides a more intense and prolonged exposure as a follow-up to the initial STARBASE program, broadening and strengthening the program's impact. With the emphasis we place on developing a growth mindset, nurturing collaborative problem solving, establishing real-world relevance of STEM content, and making connections within the community through mentors and service learning projects, STARBASE students leave the program better prepared to contribute to a future that is not yet defined.

The STARBASE mission is not constrained within our four walls. This year, STARBASE staff members presented at professional conferences, collaborated with business, industry, and educational leaders, distributed parent informational literature, and volunteered at a number of community events. We are committed to making a difference and developing a STEM-centered culture in our community. This edition of *Louisiana Lagniappe* provides an enlightening survey of our mission, our philosophy, our approaches, and our commitment to our community. It's a chance to get a little peek behind our doors and understand *why* we do the things we do. Working with students and teachers in our numerous outreach programs, we are investing in our nation's infrastructure by helping to develop the next generation of thinkers, doers, and innovators—our future citizen workforce.

We have a three-fold mission at STARBASE Louisiana. Our primary mission is to excite students about STEM subjects and give them a solid foundation to aid in their future studies. We are also dedicated to partnering with visiting classroom teachers by providing tools and ideas to reinforce and extend the content learned at our site. Lastly, we are passionate about STEM education and the training of future educators. As a part of this last mission, STARBASE Louisiana has partnered with Louisiana State University in Shreveport to provide a unique field experience opportunity for undergraduate students during their semester of student teaching. They follow one class through its 5-day session, working closely with students to see the entire curriculum unfold.

Since 2002, STARBASE Louisiana has mentored nearly 200 pre-service teachers. While at STARBASE, these pre-professionals have an opportunity to see a unique teaching environment. They see how teachers can work together closely as a team for the benefit of the students. They see how subjects that are traditionally taught in isolation can be integrated into a holistic learning opportunity. Observing research-driven classroom management techniques and lesson development practices provide student teachers with another resource from which to draw during their own teaching career. They see that there are many creative ways to present curriculum to students. Tiffany Landis, a 2015 LSUS participant, put it like this:

STARBASE taught me that you don't have to put on a dog and pony show to make lessons engaging and interesting for your students. All you have to do is think outside of the box, use materials that are inexpensive and easily accessible, and come to school every day excited about what you are teaching.

Not all student teachers at LSUS take advantage of the opportunity to attend STARBASE. But those who have are dedicated to professional excellence, and many of them will tell you that their STARBASE field experience played a big role in their training. Our goal in the upcoming year is to have as many pre-service teachers take advantage of this opportunity as possible. "STARBASE . . . provides a must-see experience for all [educators]. . ." (Shelby Taylor, 2015).

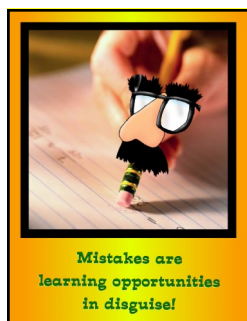
MISTAKES AND MINDSET

At STARBASE, one of our goals is to get students connected to and

Laurie
"Ditto"
Salvail
Instructor



excited about STEM. This requires our instructors to stay on top of the latest research in education. We must motivate and engage students in order to excite them. One area that has been very beneficial in achieving this goal is keeping students in a growth mindset. The term mindset encompasses your feelings, beliefs, and attitude. Those with a *fixed mindset* believe that you are born with certain abilities and capacity for learning and that those abilities and capacity cannot change. In contrast, those with a *growth mindset* understand what current brain research bears out – that the brain is like a muscle that changes and strengthens through challenge and practice. Most people are scared to fail and make mistakes, but in true learning, mistakes and failures are necessary. Our goal is to help change students from fixed mindsets, which cause them to avoid failures, to growth mindsets where students see mistakes and failures as opportunities of growth. If used properly as a part of the learning process, failures are gifts that help us succeed.



It is important for our students to understand that how smart they are is not predetermined. It is impossible for us to know the extent to which our hard work and effort can change our future. Many famous people started out with failure. They took this failure and used it as a learning opportunity, which led to their future success. We empower our students by using comments such as, "We are in the learning zone today. Mistakes are our friends!" and "As you learn this, mistakes

are expected. Your mistakes help me support you. Let's make mistakes together!" The STARBASE lessons are designed at a high level of rigor which includes hands on exploration where mistakes lead to success. It is exciting to see the students become comfortable with their explorations knowing that it may take a few tries for them to figure things out. Failure is seen as a chance to grow! For more information on growth mindset, read research by Dr. Carol Dweck and others, or visit Mindsetworks.com.

1000 CLASSES AND COUNTING

The STARBASE program at Barksdale Air Force Base has

Cassy
"Chia"
Miller
Instructor



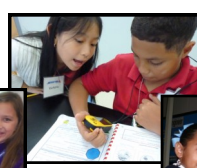
had the privilege of serving many of our community's youth for over 16 years. This May, STARBASE approaches a pivotal landmark achievement. With the classes from Judson Fundamental Elementary Magnet this spring, STARBASE will officially graduate its 1000th class. This achievement is the culmination of years of effort and dedication from numerous individuals and groups.

From STARBASE's humble beginnings in 1999 with only 4 pilot classes it was clear this program was going to be a success. Continued expansion in 2006 and 2011 kept the ball rolling toward this imminent milestone. And with the addition of the 2.0 program, STARBASE has a powerful and large influence in educating our community's youth. To date, STARBASE has graduated over 23,000 students in the Bossier/Shreveport area.



The support of the 307th Bomb Wing of the Air Force Reserve Command and the 2nd Bomb Wing at Barksdale have been instrumental to the program's success. They have maintained unwavering commitment to our mission through very uncertain times. Without their support, 1000 classes would never have been possible. STARBASE Inc., the non-profit side of the organization, has also been a huge contributor in the areas of fundraising, advocacy, and public promotion. Finally, the teachers and administrators involved with the program partnership over the years have been a driving force behind the success. The belief in the importance of a strong STEM program and relentless effort and dedication has allowed STARBASE to continue to grow and be a wildly successful program.

Look for media announcements of upcoming STARBASE celebrations scheduled for May. Our 2.0 program will conclude its fourth year of projects and competitions on May 9th with a special program at Bossier Parish Community College. We are also planning an awesome celebration of our 1000th class on May 19th at Judson! Save the dates and plan to celebrate with us!



Jobs that didn't exist for the 1st class graduates:

App Developer – Analysts estimate it will be \$77 billion industry by 2017; thousands of listings for app developers on job site Monster.com.

Blogger – Tech blogger John Gruber makes an estimated \$500 thousand per year.

Cloud Computing Services - \$150 billion industry; demand is exploding with salaries of \$80K - \$180 thousand per year.

3-D Animator – Traditional animation will be a thing of the past; in demand in film, gaming, advertisement, and TV industries.

3-D Designing & Printing of Prosthetics – CAD software, allows artificial limbs to be computer designed and printed inexpensively.

BrainGain. See more at: <https://www.braingainmag.com/the-top-10-careers-that-didn-t-exist-10-years-ago.htm#sthash.NgjfKigo.dpuf>

Jobs that will likely exist for 1000th class graduates:

Human Organ Designer / Regenerative Medicine – Soon 3D printing technologies will allow biomedical engineers to create human organs using the patient's own cells.

Water Harvester – From atmospheric water harvesting to desalination of seawater, innovators will be finding sources of drinking water to get it to people all over the world.

Space Pilot – Private companies such as Virgin Galactic are currently working toward piloting commercial trips into space.

Drone Piloting / Designing / Traffic Control – Currently, Amazon is pioneering the ability to deliver packages via drone. The future of the delivery process for many companies will be airborne and automated. If you are interested in media, drones are currently used for filming movies and sporting events.

<http://stemjobs.com/future-stem-careers/3/>



**Benjamin
"River"
Williamson**
2.0 Coordinator

SCIENCE THROUGH THE EYES OF HISTORY

Last year, I was honored to be accepted into the first cohort of teachers from around the country attending the *Real World Science Seminar* at the World War II Museum in New Orleans. Sponsored by the Northrop Grumman Foundation, this seminar modeled using a multidisciplinary approach to teaching science—through the lens of history.



At the weeklong seminar, we were able to spend time learning about how the needs of World War II spurred innovations such as penicillin, radar, computers, and nuclear energy. "Necessity is the mother of invention," (*Plato*), and that was never more true than

during that period. We spent time touring the museum, handling artifacts in the museum's collection and learning how the museum can ship artifacts to our school to share with our students. This hands-on approach to learning about the war is not limited only to the history classroom but allows science teachers to connect their students to real-world applications of science within its historical context. Such a multidisciplinary instruction is brain-based and allows students to make more connections and learn at a deeper level. Teaching science through the lens of history not only provides context for the content, but it illustrates the relevance of the information being studied and connects your students to real, emotional stories—all of which enable the learner to better internalize the information for later recall.

We also participated in a number of history-based science lessons in the museum's classroom. These lessons covered a broad range of topics including physical science, materials science, electricity and magnetism, innovation, and engineering. We have implemented one of my favorite lessons in STARBASE 2.0 — electrical circuits made with conductive modeling clay! The final days of the Real World Science Seminar were spent on the campus of the University of New Orleans, where we learned about advanced materials research, discussed inquiry and research-based labs versus recipe-based labs, and were even able to operate a Transmission Electron Microscope.

The experience provided me an opportunity to connect with other passionate and inspiring educators from around the country. I highly recommend this fantastic opportunity to engage with the museum staff and other teachers and learn about how we can integrate history into the science classroom. If interested in being a part of the 2016 cohort go to: <http://www.nationalww2museum.org/learn/education/for-teachers/summer-teacher-seminar.html>.

MENTORING: RELATIONSHIPS MATTER

Marian Edelman, founder of the Children's Defense Fund, explains the importance of mentoring by stating "You can't be what you can't see". With the need to fill nine million job openings in the STEM fields*, today's academic pipeline must not only prepare "STEM-literate" students, but also personally connect them with career possibilities in STEM. Research suggests an important building block in connecting and inspiring students is the incorporation of STEM mentors.

According to the National Mentoring Partnership (2014), a mentor is "a supportive adult who works with a young person to build a relationship by offering guidance, support, and encouragement". Research demonstrates having STEM professionals serve as mentors can offer many benefits including sparking students' interest in STEM, encouraging soft skills, and providing academic support. Mentoring also has been shown to reverse stereotypes, foster diversity in the workforce, and help authenticate equal opportunity in the eyes of



**Pam
"Roller"
Thornell**
Instructor

STEM OPPORTUNITIES IN THE BOSSIER-SHREVEPORT AREA

STEM is a buzzword you may hear mentioned in the media, schools, and community. But do you know why it is important? STEM is the foundation on which our modern society is built. Due to advancements in these fields, we have safer roads, faster computers, less invasive medical procedures, and so much more. The need for innovation and effective problem solving in the workplace is greater than ever. To stay competitive in today's world, we must be proactive about educating future generations in STEM. Luckily, educators are finding ways to engage and excite learners in these disciplines. Our community offers many STEM programs and opportunities starting even before elementary school.

STARBASE Louisiana, which began impacting learners in STEM before it ever became a buzzword, serves every fifth grader in Bossier Parish as well as hundreds of Caddo Parish students every year. The second phase of our program, STARBASE 2.0, works with 6th – 8th grade students in three local middle schools. Outside of STARBASE, robotics clubs are springing up in many of our schools and students can compete in parish-wide competitions sponsored by NICERC. Of course, Sci-Port actively engages people of all ages to explore biology, physics, space, technology, and math through in-school programs or general admission. Norton Art Gallery has



taken on the STEM mission and provides various STEAM (with inclusion of the Arts) learning opportunities for both students and teachers at their facilities. The Girl Scouts and Boy Scouts of America, as well as the National 4-H program have also incorporated a great deal of STEM education into their curriculum. Children as young as preschool can participate in Lego Bricks 4 Kidz® classes at local daycares, afterschool programs, or at their location in Shreveport, providing a fun, hands-on STEM learning and building experience.

For older students, the Science & Medicine Academic Research Training (SMART) Program provides academically advanced high school seniors who are interested in careers related to medicine, scientific research, and biomedical engineering opportunities an opportunity to engage in intense research and medical clinics. LSUS offers dozens of summer classes with a STEM focus for all students, such as forensics, animation technology, coding, and much more. Contact their Continuing Education department.

There are many other wonderful STEM programs in the Shreveport/Bossier area. We encourage you to look for and take advantage of these opportunities. If we encourage STEM education as a community and promote experiences in STEM as teachers and parents, we are preparing our children for success today and for the world of tomorrow.

at-risk students.* They see STEM fields are truly open to everyone.

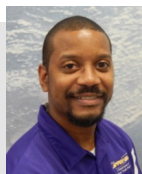
Much of the success of STARBASE 2.0 is due to the strong mentor presence. We have witnessed the benefits of the influence brought by our dedicated mentors, and have seen first-hand their impact on the participation and personal goals set by the students. These mentors are helping students make real-world connection to the STEM content and allow them to see real people, just like them, in real STEM roles. Their guidance and expertise allows our 2.0 program to have a greater impact.

How can educators take advantage of this valuable resource? A good place to start is partnering with local STEM industries and businesses who desire to have a local talent pool for the future. With numerous businesses and non-profit agencies willing to supply mentors and the research to back it up, this is an important step more educational programs should make.

*US2020. 2014. *The Case for the STEM Mentoring Movement*.

**Mary Beth
"Snow"
Irvine**
2.0 Instructor





**Eric
"Iceman"
Freeman
Instructor**

WHY FOCUS ON THE "E" IN STEM?

"STEM education is an interdisciplinary approach to learning that removes the traditional barriers separating the four disciplines of science, technology, engineering, and mathematics and integrates them into real-world, rigorous, and relevant learning experiences for students."* STEM allows students to see how these disciplines are deeply intertwined in the real world, enhancing the classroom experience and helping them learn more effectively. All four topics are important in education, but there needs to be an increased focus on the "E" in STEM - Engineering.

Engineering by definition is "the application of science and mathematics by which the properties of matter and the sources of energy in nature are made useful to people." (Merriam-Webster.com) In other words, engineering applies the knowledge, facts, and principles of science. It is the subject that ties in or brings all the disciplines together. ENGINEERS use MATH methods and tools of TECHNOLOGY to apply the SCIENCE of what we know and are learning about the world to solve problems and make life better. Someone may ask, "Why introduce young children to engineering?" In my experience, children are fascinated with building things and taking things apart to see how they work. Children are natural born engineers. Engineering allows them to explore the man-made world.



Engineering is more tangible than science. It makes science and math *real* and answers the question, "Why do I need to know this?" A focus on engineering helps build students' science and math skills. Engineering calls for children to *apply* what they know about science and math, enhancing their learning. A focus on engineering can help build classroom equity. When working through the engineering design process, the stigma of failure is removed. Instead, failure is an important part of the problem-solving process. In the real world, engineers design a prototype and make many modifications and improvements before they perfect the design. In addition, engineering draws in students who traditionally view science as irrelevant. The National Science Teachers Association (NSTA) states that through engineering "*diverse students deepen their science knowledge, come to view science as relevant to their lives and future, and engage in science in socially relevant and transformative ways*"**.

Most importantly, a focus on engineering helps build students' 21st century skills (The Four Cs) - collaboration, creativity, communication and critical thinking. As students work together to design a solution to a problem or create a product, they must collaborate and communicate effectively, engaging in the 4 Cs. These skills are critical for career success in any field. NGSS is committed to raising engineering to the same level as scientific inquiry, and explains that engineering design "*allows them (students) to better engage in and aspire to solve the major societal and environmental challenges they will face in the decades ahead.*" As educators, we are also economic developers, cultivating the future workforce by providing not only knowledge and skill development, but also building better citizens to engineer a better future for all of us!

*Vasquez, Sneider, Comer. 2013. *STEM Lesson Essentials*.

**National Science Teachers Association. 2013 *Next Generation Science Standards: Engineering Design in the NGSS*.

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A Department of Defense Youth Program
Louisiana