Interface

Journal of the WTEA

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Volume 56 Number 2
Winter 2016 - 2017

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Feature Article by Auer Steel

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The WTEA Membership fee is not refundable. The WTEA School Subscription fee is not refundable, but is transferrable to other staff in the same school district. The portion of the non-member conference registration fee equal to the amount of the WTEA membership fee is non-refundable. Refunds for Conference Registration and/or Awards Banquet must be received by US Mail or by email at least 15 days prior to the event. Exhibit space cancelled after Jan. 10th will be subject to a $100 cancellation fee. No refunds will be given for exhibit cancellations within 45 days of the event.

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From the President's Desk

By Steve Meyer, WTEA President

Hello WTEA members and Happy New Year. I hope all of you had some time with family over the holidays to relax and rejuvenate for the second semester of the school year. It is hard to believe that we are almost halfway through the school year. Where does the time go? There are many things that always seem to come up right after the holidays such as this edition of the Interface, the Winter Board Meeting, the WTEA conference, SkillsUSA events, WEEVA Supermileage and Electrathon challenges, ITEEA annual conference, and the list goes on and on.

You may have seen the 30 in 30 challenge that I sent out to get more members and teachers signed up for the DPI TechEd listserve. The challenge was to get 30 more people signed up in the 30 days of November. We met our goal and continue to see more members sign up. This is our number one way as teachers to communicate to the masses. Nice work everyone in getting new people signed up for the listserve. Let's keep this rolling! A special thank you goes out to Garrett Pongratz from Central High School - District of Westosha. Garrett has taken it upon himself to help organize the content from the listserve for ease of use by our members. Nice work Garrett and thank you for your positive contribution to our field!

The WTEA board is in hot pursuit with conference planning. Booths are set, vendors are ready to rock and roll, presenters have been booked, awards candidates are being reviewed, etc. It is going to be another great conference. If you have not registered yet or talked with administration about getting to the conference, be sure to take care of that immediately! You will not want to miss this conference. The board will have its Winter Meeting on the 13th and 14th of this month. If you have any things you would like to bring to the table, please be sure to email your district representative.

This edition of the Interface marks the pilot test of a "Feature Article." The feature article in this edition is sponsored by Auer Steel and Heating Supply Company. Auer Steel headquarters is in the Milwaukee area with 8 locations throughout the midwest. Auer Steel is very active in promoting Technology and Engineering Education, the WTEA, and all the careers available in the HVAC industry. Auer Steel will have a booth at the conference and will be sponsoring the Awards Banquet. The WTEA is very excited about the "Feature Article" and the new found partnership with Auer Steel.

Along with the Feature Article, we have yet another great issue in part thanks to our Editor, Doug MacKenzie and Executive Director, Joe Ciontea. A portion of things to look for include:

- Some President Elect and Secretary/ Treasurer candidate bios.
- A Fab Lab opportunity through Three Lakes School District.
- An article from Mike Cattelino regarding apprenticeships.
- Conference updates.
- Board meeting highlights.

In closing, please put March 2nd and 3rd on your calendar for the annual WTEA Conference at Chula Vista in Wisconsin Dells. I hope you have some New Year's Resolutions . . . lend a helping hand, contribute to our wonderful field and organization, learn something new, promote the work of others, and make it a great day. Let us know if the WTEA can help you with your resolutions in any way.

Take care,
Steve Meyer, WTEA President

Students create prototypes of toy vehicles produced for Christmas during a Manufacturing Engineering class.

WTEA BOARD NEWS

Fall 2016 WTEA Board Meeting Highlights

By Mike Catellino, WTEA Vice-President

The WTEA board met in October. The meeting was a blended format with options to attend in person, by web conference, or by phone conference. The majority of the board utilized the web conference option and a quorum was present. Joe Ciontea, Steve Meyer, and I met at FVTC to coordinate the web and phone conference technology. It had the feel of an NFL draft "war room" with laptops and several phones active. In the end, it was felt that the meeting was effective in that we were able to connect, network and get "board stuff" done while not needing to travel.

The following are the highlights from the meeting:

- Board member update – Candidates for president-elect and secretary/treasurer will need to be identified within the next few months for the upcoming election. Matt Schultz currently holds the secretary/treasurer position and he may run again. The board position of industry representative also needs to be filled.
- Conference program update – the 2017 conference is coming together nicely. Speakers are confirmed. Fox Valley Tool and Die (Kaukauna, WI) President Peter Uvaas will be the open session keynote speaker. WTCS President Dr. Morna Foy will be the Friday lunch keynote speaker.
- President's update – Steve Meyer shared several thoughts and action items relating to outreach and promoting the TEE teacher trade. Steve is also looking at new board committees' structure.
- Executive Director's report – Joe Ciontea shared that the WTEA is financially stable. He also shared ideas for silent auction items for the president's reception at the annual conference. An additional award, called the "Inspire Award" will be awarded by the awards committee at the conference awards banquet.
- Conference Trade Show update – Tom Barnhart submitted a report stating that expectations are that the trade show will be sold out.
- District reports – Many district representatives reported recent or future activities that would involve the district membership.

Next board meeting will be January 13-14, 2017, at the Chula Vista in WI Dells.

- Dates to Remember -

March 2 - 3	**48th Annual WTEA Conference**	Wisconsin Dells, WI
March 16 - 18	**ITEEA Annual Conference**	Dallas, TX
April 25 - 26	**44th SkillsUSA State Conference**	Madison, WI
June 19 - 23	**52nd Annual SkillsUSA National Championships**	Louisville, KY
July 10 - 13	**Automotive Technology Summer Institute**	Western T. C.
October 25 - 27	**Career Pathways Network National Conference**	St. Louis, MO
December 6 - 9	**ACTE Career Tech National Conference**	Nashville, TN

DISTRICT NEWS

District A

Sylvia Tiala

Tech Ed instructors in District A have been busy talking about, and applying for, the newest round of Wisconsin's Fabrication Laboratories grants. Rice Lake's Fab Lab coordinator, Mark Beise, has been starting a network of people interested in Fab Labs. Thanks Mark!

On November 16th I had an opportunity to present the Models of Engaged Teaching and Learning (MELT) framework to a variety of Career and Technical Educators. Over the course of 90 minutes we looked at how the framework incorporated the problem solving model we all know well. More importantly we had conversations about using the framework to communicate with parents, administrators, and our peers about how we engage students in critical thinking skills. The framework helps us move beyond the "hands on" aspects of education and have a richer conversation about how we engage students in critical thinking skills.

As always, please let me know if you have idea for area meetings and activities. Thanks!

District F

Eric Sutkay

By the time this reaches you the school year will be, or close to being, half over. Where has it gone? What do we have to look forward to for the spring semester? While the details of a Tormach CNC-High Tech weekend have not yet been ironed out, I have been planning a district event for February/March. I have met with the folks at American Roller Company in Union Grove, and they would like to host an event. A tour and possibly some partnership exploration would be in store. They are very excited about working with local schools and the technical college to provide opportunities for our students. This would be a great opportunity to meet with some of the employees and directors to discuss what some opportunities might be. Keep a close eye on your email for registration and event details. If you have any further suggestions or interests for a district event please do not hesitate to call or email me.

District C

Mike Paquette

As I sit by my fire on this cold
winter's night,
I recall with fond memories the
days that we spent
Nestled at home with families
and friends.
We work through the night, on
projects and grades
With hope that the kids will
appreciate the industrious.
The Fall is now gone dropped out of sight
Covered just now with Winter's delight.

As I look behind I am happy to see
Friends who attended the N.E.W. math movies premiers
with me.
The hors d'oeuvres were fantastic, and so were the
friends.
I think next fall we will do it again.
I saw Tom, Dave, Jeremy and more.
We chatted and talked walked all round the floor.
If you were there and we missed you I am sorry indeed
Often a break with colleagues is just what we need.

But if more is what you crave, more we will have
We will meet in Menasha to have such a bash.
Jay and Kevin will put on a show,
Collaboration to make engines go.
With dynos and engines we do plan to play
On January 27th and 28th is the right day.
For more information do give me a yawp
Go to wtea-wis.org and stop.

One more thought before I bid you adieu
A new year's resolution I give to you.
I will keep my priorities all but the same
Keep families and friends close and together again.
Spend lots of time with both exercising in the weather.
Make it fun and playful but keep all my digits.
Remind myself daily "life is full of work"
Pick at it daily and don't be a jerk.
Say sorry, and hi with a smile indeed
Turn off my phone and be present while in need.

I hope to see you soon at Menasha or the WTEA Spring Conference!

WTEA VICE-PRESIDENT

Apprenticeship
Not a New Way of Thinking - Just a Renewed Emphasis

By Mike Cattelino, Fox Valley Technical College

When you hear the term apprenticeship, what are the first things that come to mind? Swing-shift work, doing the tasks that the experienced workers deem as beneath them, dark-dusty-dirty work environment, have to be in a union, etc.? Trust me, I have heard many of the perceptions regarding apprenticeship and most are inaccurate. As the newly named (August 2016) Apprenticeship Manager at Fox Valley Technical College I feel humbly honored to have the opportunity to work with all of our apprenticeship programs. The programs range from Cosmetology to Steamfitting and many in between.

The federal and state government have committed notable resources to apprenticeship in recent years. So what is apprenticeship anyway? It is NOT a job, it is quite simply a mode of instruction. There are two types of formal apprenticeships in Wisconsin. Youth Apprenticeship (YA) and Registered or Adult Apprenticeship (RA). In both apprenticeships, there is a formal education component and an on-the-job component that comprise the entire learning mechanism. In both cases, the formal education aspect makes up about ten percent of the term of the apprenticeship, the primary mechanism for learning a respective craft is on-the-job working directly with a skilled craftsperson. Again, don't think of apprenticeship as a job, it is a mode of instruction. It is part of a pathway in many trades that leads to a credential that allows someone to have a fulfilling career in their field of interest. In the case of plumbing in Wisconsin, the only way to get an education and a credential is through an apprenticeship. There are no associate degrees or higher in plumbing that I know about in Wisconsin. The sought after credential in the plumbing trade in Wisconsin is a state license, which must be renewed with continued education units at prescribed intervals.

How does someone get into an adult apprenticeship you might ask? Step one is by finding full time employment in a career field of interest with an employer that sponsors apprentices. The employer selects the apprentice and then the journey begins. Easy, right? Put yourself in the shoes of a high school graduate that wants to be a plumber. That graduate would need to find an employer that will hire them full time and then commit to an apprenticeship. Hopefully, you can start to see where things can go awry. How many recent high school graduates have the courage to search for jobs like this?

How can you, a dedicated TEE teacher and WTEA member, help? Look into Youth Apprenticeships for your high school juniors and seniors. The YA process is a very good way for young adults to explore and engage in careers before committing to something full time after high school. Reach out to your local businesses and see what one(s) might be interested in being sponsors. Find out more about Youth Apprenticeship in WI and get your students involved. This is a way to start the conversation with employers if you haven't already. This is THEIR future workforce waiting for them to connect with. Contact me if you would like, I would be happy to discuss the program with you.

What makes apprenticeship any more 'attractive' than any other education path? It is ultimately what suits the individual. Apprenticeship is predominantly a hands-on learning mechanism. The apprentice learns the craft by watching and learning from an experienced craftsperson, mostly by hands-on demonstration and repetition. How many students in your classes prefer hands-on, demonstration, and repetition over other learning styles? The challenge that we have realized for our instructors in apprenticeships is the formal instruction aspect counters

that mindset. On average, adult apprentices spend one full day every other week in class. One full day, in class. The instructors try their best to make the classroom learning experience rich by mixing in various teaching methods throughout the day. The richness of the apprentice's individual experiences within each cohort is what makes the classroom environment very dynamic.

The financial reality of the apprenticeship pathway is something to realize as well. Again, the employer chooses the apprentice, so call it an earned opportunity or even a scholarship. About 75 percent of the employers I work with support the tuition costs for their apprentices. Some of the employers pay the tuition directly, others reimburse the apprentices upon successful course completion. Many employers cover the cost of books, supplies, tools, etc. as well. Some employers even commit to travel costs and a per diem when the apprentices are attending school. Lastly, by state law, apprentices are paid their hourly wage to attend required schooling. Wisconsin is the only state in the country with that law.

The opportunities beyond the journeyman card are only limited by the individual's interests and passion. In Wisconsin, an apprenticeship can be transferred into an associate degree by taking the required general education courses. That associate degree can be transferred into UW schools toward a bachelor's degree. I did not take that particular path. I started with a technical diploma in machining, earned a journeyman card as a machinist, and then attained a BS and an MS. I worked through that path while building a family, a family that committed to my passion to help me go where I was going.

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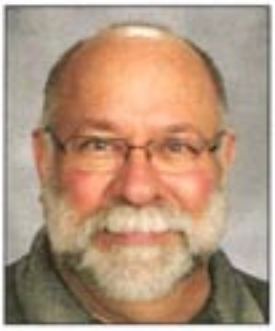
The WTEA relies on the financial support we receive from the advertisers in the Interface journal, the Conference Trade Show Exhibitors, and our Conference Sponsors. The income we receive from them not only offsets the "cost of doing business" for our association, but also reduces the fees we charge for conference registration. The average member saves about $75 per year in dues and registration because of that



income. When you shop for equipment and services for your program, remember to ask our advertisers, exhibitors, and sponsors for a competitive quote. When you attend the conference in March, be sure to spend some time in the Trade Show and explore the opportunities and resources that the exhibitors can provide to you and your students.

Joe Ciontea, Executive Director

2017 Summer Teacher Training Institute

The 2017 Summer Teacher Training Institute for automotive instructors will be held at the Western Technical College Automotive Department Building in LaCrosse. This building is located about 5 miles north of the Western Technical College main campus. This Institute will be held Monday, July 10th thru Thursday July 13th.

CANDIDATE

Candidate for WTEA President-Elect

Phillip Bickelhaupt

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Work Address: 510 Peach St., Wisconsin Rapids, WI 54494
Mobile: 715-570-9376 Work: 715-424-6715 x1036
Email: phillip.bickelhaupt@wrps.net

Education & Certifications

BS Technology Education - University of Wisconsin Stout - December 2000.
MA Educational Leadership - Marian University - December 2009.
Instructional Technology Coordinator Certification - Cardinal Stritch University - May 2014.
A+ Certification - December 2003
Google Certified Level 1 Trainer - May 2013
PLTW Certification - Digital Electronics
WI DPI PDP Review Team Certification - Teacher and Administrator Certifications
WI DPI Licenses #220, #51, #92

Professional Experience

Lincoln High School - Wisconsin Rapids - Technology Education Instructor 2001-2012

Courses taught: Electronics, Computer Repair and Networking, Woods, Auto, and PLTW Digital Electronics

Other: Head Boys Swim Coach 2006 - 2012, SkillsUSA Advisor 2001-2012

Wisconsin Rapids Public Schools - Wisconsin Rapids - Director of Technology 2012-present

Responsibilities: Directly responsible for all Instructional Technology and Information Technology (IT) operations.

Leadership, Awards and Recognition

SkillsUSA Leadership Center Inc. - SkillsUSA WI - President 2007-2012
WTEA Board Member - District Director-At Large - 2002 to present
WETL Board Member - Secretary - March 2016 to present
2009 and 2011 WRPS Teacher of the Year
2011 Herb Kohl Teacher Fellowship Recipient
2011 Wisconsin Valley Conference Boys Swim Coach of the Year
SkillsUSA National Competitors - 2004, 2005, 2007 and 2008
Member of WPRS Committee on Instructional Improvement, WRPS Assessment Committee, WRPS PLTW Advisory Committee, WRPS Quality Educator Committee, and Chairperson of the WRPS Instructional Technology Committee.
Member of the InCourage Community Foundation Business/Education Partnership Committee
Member of International Society for Technology in Education (ISTE), Wisconsin Educational Media & Technology Association (WEMTA), Association for Curriculum and Development (ASCD)

Position Statement

The WTEA has been an integral part of my experience as a Technology and Engineering instructor from the first day I stepped into the classroom. From the first district meeting I attended in the Fall of 2000 through today, I have been motivated by the excellence and innovation that Technology Education and Engineering instructors across the state continue to produce for our students. For this reason I would like to serve as the next President of the WTEA.

I believe the need for a strong voice to stand up for Technology and Engineering Education might be needed more today than ever. Changes in education at the state and federal level are sure to come as we are living in unprecedented political times. I believe my experience and current professional network will allow me to be that strong voice and advocate for Technology and Engineering Education. Being that strong voice will be one of my top priorities for the WTEA.

Additionally, if elected as the next WTEA president, I will lead our organization by helping to grow the WTEA membership, increase awareness among industry partners, community stakeholders and educational leaders on the current need of highly skilled and highly trained technology and engineering instructors, and to provide current and relevant professional development and networking opportunities for our members.

Candidate for WTEA Secretary/Treasurer

Matthew J. Schultz

6707 15th Ave. Kenosha, WI 53143
Home Phone: 262-945-2814 Work Phone:262-359-8155
E-Mail: mjschult@kusd.edu

Education & Certification

Associate Degree: 2005 UW Waukesha
Bachelors Degree: 2009 UW Stout Technology Education 220 license
Masters Degree: 2012 National Louis University

Professional Experience

I started at Lakeview Technology Academy in the winter of 2009, and since then have been busy working with a great department to tailor Lakeview into a school that has strong roots in Engineering. Lakeview is a "Choice Engineering School" offered to all of the students of Kenosha Unified. We focus on three main tracks; Mechanical and Biomedical Engineering as well as Information Technology. Lakeview has developed a name for themselves for a small school with a lot to offer. Since I started at Lakeview I have developed a strong Supermileage Vehicle program. I work hard at partnering with local businesses to align sponsorships and work opportunities for my students.

I am a strong believer in extracurricular clubs. There is never enough time in the school day to cover all of the cool stuff that Technology Education has to offer. Because of that I started an Underwater Robot club, as well as taking on a Sumo Robot Club. These after school clubs offer my students more depth into robotics, a growing curriculum at Lakeview.

Lastly, I am a strong believer in SkillsUSA. I help out where I can, chairing Model Rocketry and hosting our first district event at our school. It is quite rewarding to see my students taking a leadership role.

Position Statement

Five years on the board as Secretary/Treasurer, four years of being WTEA Awards Chair, 15 Board meetings, five WTEA Spring Conferences, one ITEEA Conference host, four WTEA Spring Conference presentations, one High School Program of the Year Award, and countless relationships and friends and I still want more. My resume with the WTEA has done nothing but make me love teaching Technology Education more and more each year. I would love another term as WTEA Secretary/Treasurer. My profession is teaching, my passion is education, and my love is family. My beautiful wife, Ali, and I are currently 8 months into parenthood. Our beautiful daughter Willomina Mae "Minnie" Schultz joined our family and since has blessed my wife and me with daily joy.

Besides starting a new family, my wife and I started a family business last spring. My wife having a horticulture degree and managing many different green houses, dreamed of starting a CSA (Community Supported Agriculture) or "membership farm" as more people have come to know it. We started small with 15 members last year and are looking to triple our membership. We farm only one acre, but utilize every inch of it. We raise not only produce, but chickens and bees. Our farm has come to be my summer job. I love every minute of it. My wife is the green thumb and I am the agricultural engineer coming up with irrigation systems and building custom tractor implements.

Each year I get more and more excited about being a teacher. My school is well equipped, my team of teachers in the tech department are superb and my students are chomping at the bit. If re-elected as Secretary/Treasurer I will continue to do my best to make the WTEA Awards Night at the Spring Conference a special deserving event for all recipients. I will continue to present at the conference on worthwhile topics in the classroom. I will continue to travel and visit high schools in the state supporting Technology Education.

Ever since I attended my first WTEA conference as a freshman in college at UW-Stout I knew I wanted to be a part of this incredible organization. Every day I appreciate being a Board member and look forward to many more years as a WTEA member.

RESOLUTIONS

New Years Resolutions

Happy New Year WTEA Members! The following are New Years resolutions from several of the WTEA Board members.

Steve Meyer, WTEA President

- Eat better (this never works for me, especially around the holidays).
- Learn more about how to incorporate 3D printing into my classroom.
- Spend more time with my family.
- Promote the WTEA and the exciting things we are doing for the field of Technology Education.
- Take a break from school work to go snowmobiling and tinker in the garage.

Dave Stroud, Director at Large

- Lose that last 10 pounds (already lost 65).
- Continue to improve the Construction program and related opportunities at Ashwaubenon High School.
- Incorporate more community service projects into my courses.
- Clean up my language (I enjoy swearing, but want to challenge myself to stop).
- Be nicer to Tom Barnhart.

Sylvia Tiala, District A Director/ Univ. Rep.

- Find a proper work - life balance.
- Convince my husband that a healthier life style includes vegetables beyond corn and potatoes (this may not be achievable).
- Exercise more and eat less.
- Have fun working with K-12 teachers in engaging practices for learning and teaching!

Jesse Domer, Past-President

- Be a better father and husband.
- Learn and apply Raspberry Pi's into my curriculum.
- Regrow our Tech Ed program to three teachers again.
- Use my boat more this summer (only used it twice last summer).

Jon Larson, District D Director

- Workout more and help with healthy meals for the family.
- Focus on my family when I am away from school.
- Plan fun activities for me and my 2 kids this summer.
- Plan and host a WTEA district meeting at FVTC.
- Ice fish with my 4 yr old daughter at least twice.
- Shore up my PDP so I don't panic in a couple years.

Phil Bickelhaupt, Director at Large

- Eat better and exercising more (this is on there every year, but of course life sometimes gets in the way).
- Canoe the WI River from Stevens Point to the Chula Vista in the WI Dells!
- Create more ways for all students K-12 in my district to experience STEM activities!
- Teach my kids to water ski this summer.
- Promote the importance of CTE and the WTEA.

Travis Ray, District G Director

- Begin a new work out program.
- Get out on the lakes more with the family.
- Get back out West again this summer.
- Spend more quality time with the family.
- Finally get my food plots in.
- Incorporate the CNC router into more of my classes.
- Bow hunt more in the fall and fish more in the spring.
- Tell my wife and kids that I love them every day.

Joe Ciontea, WTEA Executive Director

- Loose 10 lbs. by Memorial Day.
- Clean my desk at least twice a month.
- Learn Photoshop.
- Improve my golf game.
- Catch more fish in 2017.
- Spend more time connecting with my neighbors.
- Pull the saxophone out of the closet and play it again.

Pete McConnell, District B Co-Director

- Continue the conversation.
- Invent new RAK's (random acts of kindness).
- Discover my new hunting land.
- Take care of myself and my family.
- Try to understand Junior High students.
- Thank God for good friends and colleagues.

Bryan Albrecht, Marketing Chair/ Director at Large

- Connecting with old friends to foster balance into my life and career.
- Volunteer more in my community promoting service as a life value.
- Mentor a student and expand access to technology learning resources.
- Support high school partnerships to strengthen career pathways for youth and adults.
- Have fun at the lake with family and friends.

Brian Schiltz, District B Co-Director

- Smile and laugh and get others to do the same.
- Start reading books on leadership once again.
- Getting outside i.e. ice fishing, snow-shoeing, and bow hunting in the fall with and without the family.
- Give my wife and kids a hug and a kiss everyday.

Doug MacKenzie, Interface Editor

- Continue to strive to make the Interface a professional looking magazine.
- Even though I'm retired, keep up to date with current topics in Technology & Engineering.
- Eat healthy and hold my weight to the low 150's.
- Get enough exercise.
- Take more driving trips.
- Every day tell my wife I love her.

ARTICLE

Life After the Classroom

After a career filled with 100+ students per year, staff meetings, parent conferences, in-service, SkillsUSA events, WTEA conferences, and much more, teachers eventually retire and leave the classroom. College students graduate and a new cycle begins. We are creating this column to show life after the classroom. Each issue we plan to highlight one or more of our retired colleagues. Maybe you met them at an event, worked with them, or even had them as your classroom teacher and inspiration. If you know a retired colleague and would like to help us feature them, just contact Doug MacKenzie.

FYI, did you know that retired TEE teachers who wish to keep connected to the WTEA can become a WTEA Alumni member for only $20 per year? Membership includes free registration to the annual conference. Contact Joe Ciontea for details.

Do You Remember Dave Rasmussen?

After teaching for 35 years in Australia, Minnesota and Wisconsin and loving every minute of it, I knew that I wanted to retire before I was no longer an effective teacher. So, the decision was made and as August rolled around and people were gearing up for school, I knew I needed a distraction. Planning a three week trip to Australia was just the ticket to keep my mind off of lesson plans, projects and to get rid of those teaching nightmares where I'm standing in front of my students and I've forgotten how to teach. Is there life after teaching? You bet there is! For me it's been a chance to do those things that I couldn't do because of the school schedule, like take a three week vacation in the fall. I've had more time to hang out with my family, to help my kids with building and remodeling projects, to vacation at any time of the year and to go fishing! Volunteering is part of my retirement plan and I love that I can help a neighbor or a friend at any time now, not just evenings and weekends. Teaching is part of my retirement plan as well and I've gotten involved with teaching classes at the Porcupine Mountain State Park Folk School. I have taught several classes on how to build bat houses, Greenland kayak paddles, chevron cutting boards and a game called Kubb. (Check out www.porkies.org for more information). I also work with the Park Naturalist on a special Earth Day project where we build bat houses with 4th graders at the local school and teach them about the importance of bats. I'm still in school and teaching, but in an entirely different environment.

Retirement has also given me the time to build my own house and garage, putz around in the shop, go fishing early in the morning or whenever the salmon are in, go hiking or cross country skiing on a weekday, climb glaciers in New Zealand, and spend lots of time with my wife and five grandchildren. My wife and I were able to help our son build his tiny house in Washington and

then, the next year, his tiny art studio. We were able to help our other son move cross-country and to go visit our daughter in the middle of the winter. I now have more time to serve on some worthwhile committees in our county and to give back to my community. There's plenty to do in retirement, and the best part is being able to pick and choose what I want to do.

Oh, and remember those teaching nightmares that I used to have where I'm standing in front of my students and I've forgotten how to teach? I still have them!

Fall Leadership Conference

By Amy Kennedy, Event Coordinator

This past November SkillsUSA WI held a very successful Fall Leadership Conference at the Chula Vista Resort in Wisconsin Dells. Over the two day event with several SkillsUSA WI Alumni, 157 chapter leaders repre-

senting 26 schools learned how to run a high quality chapter. The intense conference involved four groups of students, advisors and alumni acting as separate Skills-USA WI chapters. They held mock officer elections, chapter meetings, fundraising activities, team building activities, and community service activities while building their knowledge of the SkillsUSA WI Framework, Program of Work and Chapter of Excellence programs.

Chapter advisors had opportunities for advanced conversations regarding these programs for their chapters. They also shared community and fundraising ideas and networked with other advisors.

The Leadership conference was led by the SkillsUSA WI Alumni. They developed and facilitated the training program and chose the Water Step program as the official philanthropy for this event. Alumni encourage all chapters to bring and donate new and gently used shoes. The shoes are sold to an exporter and funds received help bring clean water to those in need. The WaterStep Project assists in funding safe drinking water projects all over the world — projects that help to save hundreds of thousands of lives each year. In addition to funding water projects, donated shoes keep hundreds of tons of waste out of our landfills. The SkillsUSA WI alumni are already working on next year's program that will take place in the fall at the beginning of the school year.

SkillsUSA

News From UW-Stout

By Sylvia Tiala

It has been an exciting few months at UW-Stout. There are a lot of changes that are exciting to see.

Welcome Barb Bauer
Program Director for Technology Education

Please help extend a welcome to Barbara Bauer who is the new program director for UW-Stout's Technology Education teacher preparation program. Barb is a familiar face to many of you who are Stout grads. You will recognize her as the lab manager for the Tech Ed program. Barb agreed to take over as the program director starting this fall. She has been working diligently to reach out to our K-12 stakeholders, work on articulation agreements with Wisconsin Technical Colleges and is committed to reaching out more proactively to our K-12 partners. It's exciting to have Barb working in her new role at UW-Stout. Please feel free to contact Barb at:

Office: 230 Communication Technologies Building
Phone: 715-232-3482
Email: bauerb@uwstout.edu

Career and Technical Education (CTE) Summit Update

Representatives from business/industry, elected officials, K-12 stakeholders, and postsecondary education convened in June of 2016 to help Stout's CTE faculty to dialogue about the role of UW-Stout in Career and Technical Education. Stakeholders helped the CTE faculty envision how we might position ourselves as a world-class leader in Career and Technical Education. After taking time to sort through comments and strategize, the CTE team came up with three major goals with immediate, short and long term strategies. The three major goals are:

1. Expand the pipeline of CTE teachers and leaders.
2. Increase the visibility of UW-Stout CTE programs and faculty.
3. Integrate Academic and Career Planning (ACP) initiative into curriculum.

The Tech Ed faculty at UW-Stout are moving forward to work with the Troops to Teacher program and to plan articulation partnerships with technical colleges as a way to expand the pipeline of CTE teachers and leaders.

Tentative plans for a June 2017 CTE Summit are already underway.

UNIVERSITY OF WISCONSIN
STOUT
WISCONSIN'S POLYTECHNIC UNIVERSITY

Pleasant Prairie Mini Maker Faire
A Successful Event

By Matt Schultz, Lakeview Technology Academy

We are living in the Maker Movement, and what an exciting time it is. The affordability and availability of tools, prototyping equipment, CNC, Robotics, micro controllers, open source and online resources/ideas are at the highest they have ever been. Whether you are a fabricator, programmer, artisan, or just a do-it-yourselfer, you are a Maker. In June, I was asked if I would be a member of the Pleasant Prairie Mini Maker Fair Committee. Of course when I heard that there would be a Maker Fair in my back yard, I jumped at the opportunity to help. Planning took its course and in a few short months we had organized an amazing event. With over 30 makers of all talents, Pleasant Prairie held the first Mini Maker Faire. I got my students involved from the very beginning. We organized school projects as well as some of their personal projects to bring. The class came up with projects that we could do there called "Make and Takes." My students brought our laser engraver and made Dinosaur 3D puzzles. We designed masks and 3D printed them making form molds to vacuum form into masks to cut out and wear. We brought our 1500 gallon remotely operated vehicle (ROV) test tank, drove our underwater robots, and showed the public just how easy it is to make a ROV. Our Energy Efficient team brought a few vehicles to display, My Principles of Engineering class brought two trebuchets and launched watermelons into the lake behind the building. Our SkillsUSA chapter brought 15 members who took care of registration and check-in for the event. It was amazing! I had over thirty students show up and help.

The event took place over Thanksgiving weekend at our local Rec Center, and was a complete success. Next year the school is going to organize a cardboard boat race in the pool at the facility for the public to bring pre-made boats. My students also plan to host a VEX Robotic challenge. I joined the committee to help and brought with me an entire school of support. It was the coolest thing in the world seeing my students showing off their work and helping younger kids get excited about Making!

Pleasant Prairie Mini Maker Faire®

A Reunion of a Great Team

By Phil Bickelhaupt, Wisconsin Rapids Public Schools

From the day I started working at Lincoln High School in Wisconsin Rapids back in 2001, I knew I was working with a great team of Technology Education and Engineering instructors. Proof of that great team came in a reunion of sorts this past November. In fact, the date was Tuesday, November 1 to be exact. This reunion was supposed to have taken place earlier in the year (September) so all of us could enjoy the wonderful view of the countryside from Mr. Terry Bores' deck, but all the retired guys were "too busy!" Being November, Wisconsin weather cooperating was probably not going to be on our side, but in this case it was! It happened to be a near perfect November day with sunny skies and temps in mid to upper sixties, so enjoy the deck and views we did!

So, what was this reunion all about? Well, it was a gathering of all the retired, former and current members of the Technology Education Department that taught at the Wisconsin Rapids Public School District. Now, I can tell you, not all were present, but a good number were. The reunion included members of the department dating back to the 1960's through the current department members, many of which recently graduated from Lincoln within the past 10 years! The reunion was a great time for us to get together and catch up with the older fellas who have retired and talk about the good old days. Of course no "Tech Ed Gathering" would be official without the mention of food and beverages. So, of course there was a few adult beverages consumed and a plethora of cheeses, dips and summer sausage to be had by all. Also, no gathering would be complete without the discussion of "hunting and fishing" and some occasional shop talk!

So why was this reunion so important and unique? I will tell you why - because it shows that we are truly a team. For our new teachers, this was a time for them to meet and chat with the people they replaced. They could talk about techniques that worked or projects they had done in the years prior. For our retired staff, it was a time to get back together and talk with the team they had spent so much time with while in their working years. For us veteran folks, it was a time to relax and chat about things other than the classroom. The other piece that was unique about this reunion is three of our younger teachers were all former students at Lincoln and went through the Technology Education program. They went on to get their degrees and then made it back to start their careers where they started their education. My point being, if you want to keep your department strong and continue with a great team in an a time that teacher shortage is a concern, build your team within! It was great to connect with these "kids" outside the classroom!

In closing, I encourage you and "your team" to have your own reunion! For us it certainly was a great time had by all!

Front Row: Jeremy Radtke - UW-Platteville '14, Phil Bickelhaupt - UW-Stout '00, Jerry Klonowski - UW-Stout '79, Larry Redepenning - UW-Stout '82 , Adam Klonowski - UW-Stout '09, Tim Linse - UW-Stout '03, Terry Bores - UW-Stout '01

Back Row: Scott Benitz - UW-Stout '86, Pete Schneider - UW-Stout '59, Bob Peters - UW-Stout '70, Dan Fara - UW-Stout '71, Ethan Schooley - UW-Stout '14, Dave Gliniecki - UW River Falls '73, Norm Schultz - UW-Stout '54, Dennis Nelson - UW-Stout '76

FEATURE ARTICLE

Auer Steel & Heating Supply Company

Auer Steel & Heating Supply Co. is an independently-owned HVAC distribution company based in Milwaukee, Wisconsin. The company was founded in 1940 by Don Curtes, Sr.

Today, Auer Steel is owned and operated by Don Curtes and his sons, Mike and Joe. Our company's growth and success has always stemmed from a commitment to provide dependable service to our customers.

Auer Steel has eight locations in Wisconsin, Minnesota and North Dakota. The company's primary customers are privately-held heating and air conditioning contractors that serve residential, commercial and industrial clients. Auer Steel and our customers provide HVAC system design and installation expertise – as well as service and warranty support to homeowners and businesses throughout the Midwest. We specialize in heating and air conditioning equipment, geothermal systems, duct-free heating and cooling products, boiler systems, radiant heating appliances and other indoor air quality solutions.

Training & Development

Professional development is essential to the growth of any HVAC contractor. Whether it's product, technical, sales or business management, Auer Steel – in conjunction with our vendor partners – offer customers and their employees the training that they need to succeed.

Auer Steel is committed to educating our customers and the industry – hosting nearly 400 hours of in-person hands-on training with over 2,000 attendees each year. Our team of nine technical support professionals are available for training and technical support at each of our locations.

Commitment to Education

Auer Steel is dedicated to supporting the HVAC industry through higher education. Our team members serve on the advisory boards of seven technical colleges in Wisconsin and Minnesota.

Starting this year, a new initiative offered by Auer Steel and its partner customers is the Don Curtes, Sr. Memorial Scholarship Fund. This scholarship program is open to students who are currently in an HVAC program at a local technical college chosen by our partner-

ing customers. Auer Steel, in conjunction with the Carrier Corporation and our customers, have committed up to $20,000 towards funding technical college scholarships. This fall, scholarships have been awarded at five technical colleges across Wisconsin and Minnesota. The most recent scholarship was awarded to a student in the WCTC HVAC program. Auer Steel hopes to expand their scholarship program to graduating high school students wishing to pursue careers in HVAC. Working together with WTEA can be a great channel to promote this new scholarship initiative.

Auer Steel further supports students and technical colleges by sponsoring a tool discount program. This program allows students and schools the ability to purchase tools, meters, and instruments at discounted personal-use pricing.

Skills Needed to Succeed in the HVAC Industry

Wisconsin's technical college system offers tremendous training opportunities for individuals who wish to pursue careers in the HVAC industry. Wisconsin has nine technical colleges offering either a 1-year certificate or a 2-year degree program.

The skills and attributes that are best-suited for a career in HVAC are broad and diverse. A strong work ethic, soft skills, a love of the customer, the ability to utilize technology and a collaborative approach are all great qualities for a career in HVAC. Mathematical and mechanical aptitude are also beneficial skills. A good business sense can serve prospects well too. The HVAC profession provides a broad range of opportunities and there's a role for almost anyone who is looking for a sustainable career with immense growth potential.

The Future of the HVAC Industry

The future for the HVAC industry is very bright. Of all of the skilled trades, HVAC is the most diverse, challenging and has the greatest career potential. There are tremendous career opportunities for a wide array of skill-sets including sales, service, installation and marketing. Based on the findings of Manpower's annual jobs survey, the most difficult jobs to fill across all professions are skilled trades jobs – including HVAC.

Auer Steel, along with our Carrier and Bryant HVAC contractor partners, are committed to working with the Wisconsin Technology & Engineering Education Association (WTEA). We are excited to collaborate on spreading the word of career opportunities for young adults wishing to pursue careers in the HVAC industry. Whether it's providing technical college scholarships or sponsoring WTEA initiatives, we are enthusiastic about partnering with such a great education-focused organization. We look forward to seeing some of you at the 2017 WTEA conference in March.

For inquiries about Auer Steel or how to bring awareness of the HVAC industry to your students, please contact Jon Hirsch. Auer Steel will also have a booth at the March conference with information on Auer Steel and the HVAC industry as a whole.

Jon Hirsch,
Business Development Director
jon.hirsch@auersteel.com

48th Annual Spring Conference and Trade Show: Moving sTEm Forward

The WTEA invites you to participate at the 48th Annual Spring Conference to be hosted at Chula Vista Resort in Wisconsin Dells. The conference program is packed with excellent presenters offering a variety of topics to help inspire and motivate each of us. Attend the WTEA conference with a fellow art or science teacher and your guest will be charged the same WTEA member rate if they are currently a member of their respective state professional organization. We encourage you to bring your school administrator with you to the conference; administrators are admitted free when accompanying a registered Technology & Engineering educator.

We start things off on Wednesday, March 1st with our pre-conference registration. See the next page for information about pre-conference workshops.

On Thursday, March 2nd, the conference will be begin with a general welcome to all members given by WTEA President Steve Meyer.

Our first general session will be given by Pete Uvaas, President, Fox Valley Tool & Die, Inc. Pete will discuss the need for "Hands-on Education in a Remote Controlled World." Over four decades of attendance at the "University of the Shop Floor" has provided first hand evolutionary observations of machinery and processes from nineteenth century line shaft drill presses to state of the art CNC multi-axis machining centers. Although the equipment utilized in today's skilled trades is exponentially more sophisticated, the ultimate success remains dependent on the operator. You can spend a million dollars on the machine, but it will only be as productive as "the nut behind the wheel." There is no substitute for a creative mind who is proud to work with their hands.

Thursday is also the time to visit the trade show. Our vendors are extremely important to our association and our programs. Our trade show features over 40 vendor booths with professionals exhibiting up-to-date products and services for our field. This is the best "one stop" to bring an administrator or school board member looking for input to update a program. Closing out the afternoon will be the WTEA membership meeting, and at its conclusion, the vendor sponsored SHIPS program of door prizes. Will you be one of the lucky winners this year?

Later on Thursday evening the WTEA recognizes all of our outstanding award winners during the Awards Banquet at 7:00 p.m. We honor our colleagues for their outstanding contribution to technology education. The banquet cost is $28. This is a great way to show appreciation and support for your peers. Immediately following the banquet the WTEA Foundation will host the President's Reception in the Grand Ballroom.

On Friday following the traditional Early Riser Breakfast Session, we will begin the day with diverse sectionals and vendor sponsored workshops. Friday's schedule also includes a day of hands-on automotive technology sessions at Portage High School.

Our mid-day luncheon will be followed by a keynote address from Morna Foy, President of the Wisconsin Technical College System. Morna will share insights on why "Technical Education in Wisconsin is in the Spotlight." Recognition of the role and value of Career & Technical Education (CTE) in Wisconsin has perhaps never been higher. Policymakers, researchers, parents and others are increasingly discussing the economic impact of a skilled workforce and the value of technical education. Despite this, challenges remain, including the cost of delivery - particularly in rural areas - and changes to college accreditation affecting the delivery of dual credit courses. Together, we can continue to deliver value for Wisconsin students and communities.

This year's conference will again feature some of the top Technology and Engineering Educators throughout Wisconsin and the nation sharing their expertise on topics such as: Dual Credit - Giving Students a Head Start, Craftsman with Character, New STEM Pathways: Opportunities at Technical Colleges, FREE AP course on Architecture - Draw to Build, Industry Recognized Certifications: Why and the Benefits, Middle School Roundtable, Basic and Advanced Welding, Rolling into S.T.E.A.M., Driverless Vehicles, End-User Enhanced Learning Experiences with Apple, Solid Modeling Comparison: SolidWorks and Autodesk Inventor, New Teacher Boot Camp, the popular WTEA Project Showcase, and much more!

New for 2017. We will have a conference app you can download to your electronic device. It will contain the entire conference schedule and other need-to-know conference details. Watch our website. The app will be available by the end of January.

Put March 2-3, 2017 on your calendars, get your release days approved, and fill out and send in your registration form today if you have not already done so. The convention fee is $150 for members and $180 for non-members. As a final reminder, please contact Chula Vista Resort early to reserve your room; often we are not the only event taking place at this busy resort. We hope to see you there!

For room reservations contact Chula Vista Resort, 2501 River Road, Wisconsin Dells, WI 53965, (877-745-6998) http://www.chulavistaresort.com/

Use the WTEA eStore to register online with your credit card: http://www.wtea-wis.org

Pre-Conference Workshops

Wednesday 7:30pm - 9:30pm

Formula Student - a Project Based Learning Curriculum

With project based learning activities, have you ever struggled with the following questions?

- How do I know students have the background to be successful?
- How do I track the progress of individual students in a group setting?
- How do I put more responsibility of learning into the student hands?
- How do I show an employer or administrator the skills individual students are learning?

Please come and join Jeremie Meyer and Greig Frankham as they present Formula Student, a project based learning curriculum being taught both here in Wisconsin and in Australia. The curriculum includes a learning management system that helps instructors assign jobs, track learning, and connect the skills to standards and benchmarks. The system also connects students to classroom materials including drawings and instructional video support.

Since 2007, Formula Student USA (previously known as Formula High School) has been working to help students apply their manufacturing and engineering skills to the construction of replica race vehicles. Students are then allowed to test their vehicle, against the clock, at Road America in Elkhart Lake, Wisconsin. Over the years, the design of the vehicles have been redesigned and modified to help reduce construction costs, decrease build time and increase the learning opportunities to the students.

Whitebox Learning Presents
"Turn-Key STEM/Engineering Program for Grades 6-12"

Whitebox Learning is a standards-based, web-based, project-based STEM/Engineering curriculum and learning system that allows students to **Engineer and Simulate** their designs virtually, before building. Students can compete virtually, from any browser, 24/7, all around the world. How cool is that?!

STEM Applications include:

Gliders2.0
Prosthetics2.0
Dragster2.0
Structures2.0
GreenCar2.0
Rockets2.0
MousetrapCar2.0
Rover2.0
SurvivalShelter2.0
KidWind 2.0.

Engage your students in the complete Engineering design process.
A fully-integrated LMS and teacher training is included.
Chromebook compatible.
Grades 6-12.

WHITEBOX LEARNING

48th Annual Technology Education Conference & Trade Show

March 2 & 3, 2017 · Chula Vista Resort, Wisconsin Dells

Tentative Conference Overview

Wednesday, March 1, 2017

7:30 p.m. Pre-registration

7:30 - 9:30 p.m. Project Showcase setup

Thursday, March 2, 2017

7:30 a.m. – 3:30 p.m. Conference Registration
8:00 a.m. – 3:30 p.m. Trade Show & Project Showcase
8:55 a.m. – 9:05 a.m. General Welcome
9:05 a.m. – 10:00 a.m. 1st General Session
10:15 a.m. – 3:45 p.m. Concurrent Sessions
3:45 p.m. – 5:00 p.m. WTEA Membership Meeting
7:00 p.m. – 9:00 p.m. Awards Banquet
9:00 p.m. (following banquet) President's Reception

Friday, March 3, 2017

7:30 a.m. Conference Registration
6:45 a.m. – 7:45 a.m. Alumni Breakfast
7:45 a.m. – 8:15 a.m. General Welcome
8:45 a.m. – 12:15 p.m. Concurrent Sessions, Vendor Demonstrations & Project Showcase
TBD – Hands-on workshops at Portage HS
12:30 p.m. – 1:45 p.m. General Session/Luncheon
2:00 p.m. – 3:00 p.m. Concurrent Sessions & WTEA Board Meeting

Thursday Keynote Speaker

Peter J. Uvass,
President
Fox Valley Tool & Die, Inc.

Friday Keynote Speaker

Dr. Morna K. Foy,
President
Wisconsin Technical College System

WTEA Membership Application & 2017 Conference Registration Form

Membership year runs from September 1st through August 31st

Last Name_____ First Name_____

Home Phone (_____) _____ Local Tech College District _____ # years teaching _____

School Dist. _____ School Name _____

School Address _____

School City _____ State _____ Zip _____ E-mail: _____

Check the appropriate boxes below and total amount due.

Membership Fees: [ ] 3 year membership - $75.00 [ ] 1 year membership - $30.00 $_____

Spring Conference Registration:

[ ] $150 members [ ] $180 non-members $_____

WTEA Awards Banquet (Thursday, March 2, 2017) [ ] $28 $_____

[ ] Bill my school district - purchase order is attached [ ] payment enclosed **Total $** _____

Send completed form with payment or school purchase order to:

WTEA, P.O. Box 1312, Fond du Lac, WI 54936-1312

Phone (920)-904-2747 • Fax (920) 922-0779 • E-mail joe.ciontea@wtea-wis.org

To complete an electronic version of the WTEA membership/registration form go to www.tinyurl.com/WTEA-Conf

WTEA Foundation Scholarship

The WTEA Foundation is offering a renewable $1000 scholarship for a high school senior who commits to pursue a career as a K-12 Technology & Engineering educator.

WTEA FOUNDATION

Eligibility

- Wisconsin resident
- Enroll in technology education at a Wisconsin University and start the fall semester
- Submit completed application form and 250 word essay prior to April 15

Details of the scholarship and the application form can be found on the WTEA Foundation website at www.wteafoundation.org or scan the QR code.

Graduate Credit Opportunity for Conference Attendees

The WTEA has partnered with the Office of Continuing Education at UW-LaCrosse to provide conference attendees an opportunity to earn one graduate credit. Course participants will be expected to attend the annual conference and submit a written document within 30 days of the conference. The registration fee for 1 graduate credit will be $130. Specific course details and registration procedures are available on the WTEA home page. For more information contact Joe Ciontea, WTEA Executive Director.

UNIVERSITY of WISCONSIN
LA CROSSE

Project Showcase

Join us for the 8th Annual ***Project Showcase*** at the 2017 WTEA annual conference in Wisconsin Dells. This year the showcase will be a

TWO DAY EVENT!!!

We will have a designated breakout room Thursday and Friday to display the projects. We will organize the room into Elementary, Middle, and High School sections. Tables and power will be available. So . . . we are asking that you bring projects that we can display. Bring projects such as cribbage boards, Vex Robots, woodworking items, student poster board displays, electronic circuits, machining projects, welding samples, or even digital pictures of projects. These can be student made projects or samples made by instructors. You are welcome to include supporting curriculum, but it is not required. Watch for more information on the web and the DPI listserve as time gets closer. Please email Steve Meyer at smeyer@brillionsd.org if you have any questions.

Please consider supporting this activity.

This is an easy way to *"pay it forward"* to your profession.

WTEA
Wisconsin Technology Education Association

WTEA Foundation Raffle

A raffle will be held at the conference to support the WTEA Foundation.

Grand Prize

Afinia 3D Printer

Model H400 - $599 value

2nd place & 3rd place prizes also awarded

Tickets

$5 each or $10 for 3 tickets

Available from WTEA Board members after Feb. 1st.
Tickets will be sold at the conference up until the drawing.

The drawing will take place on Friday, March 3, 2017 at the end of the noon general session.

The winner need not be present to win.

Watch the WTEA website for more details.

WTEA FOUNDATION

The mission of the WTEA Foundation is to provide scholarships and fund STEM (Science, Technology, Engineering, and Math) education opportunities for teachers, individuals interested in becoming teachers, and students.
The WTEA Foundation is a public charity as defined under section 501(c)(3) of the Internal Revenue Code.

WTEA Conference App

Something new for 2017 the WTEA Conference. We will have a conference app (powered by Yapp) that you can use on your iOS or Android mobile device. It will have the complete sectional schedule, along with the exhibitor information and much more.

Downloading the app is easy.

1. Visit http://my.yapp.us/WTEA17 on your device and follow the instructions on the page.
2. You'll be asked to install Yapp from the app store (if you don't have it already).
3. Open Yapp and tap "Download an existing Yapp" and your app will appear.

Note: Although not completed, the app is available now. The app will continue to update as we continue to add conference details.

ARTICLE

Northwest Fab Lab Consortium

By Mark Beise, Rice Lake Area School District

On December 8th, a group of twelve educators gathered at Northern Lakes Regional Academy in Rice Lake for the initial meeting of the Northwest Fab Lab Consortium. The goal of this group is to develop a network of educators in the northwestern part of the state who can be resources to each other as the Fab Lab concept continues to grow in our schools. The night was hosted by Mark Beise and Jeremy "Pete" Peterson, at the Rice Lake Area School District's Fab Lab located at Northern Lakes Regional Academy. NLRA is the district's public based charter school for grades 9-12. The school has a STEAM (Science - Tinkering - Engineering - Aesthetics - Math) approach. The school also looks to break down the silos of content areas and take an interdisciplinary approach.

The evening was broken down into three sessions. Session One was general introductions and a tour of the Fab Lab at NLRA. Beise and Peterson discussed some of the funding that help provide materials and equipment for the facility. Session Two was a lengthy discussion about Fab Lab curriculum and projects. Sylivia Tiala from UW-Stout joined the group via speaker phone. Sylvia discussed her work at UW-Stout to create a system for sharing Fab Lab curriculum. The staff of NLRA displayed several projects and curriculum that they have developed over the past four years. Some of this curriculum and projects is teacher led, others are developed by students in a project based learning model. One nine week course that Peterson and Beise discussed was a class called "High in the Sky." This class was co-taught between Beise and Peterson and consisted of all new students to NLRA, the majority being freshmen. Peterson, who is a chemistry and physics teacher, taught the class first. He discussed Newton's Laws of Motion with the students and also some basics of flight, including Bernoulli's Principle. After a couple weeks of learning the physics about rocket flight from Mr. Peterson, the students then rotated to Mr. Beise. Mr. Beise is a technology and engineering teacher. He used this course as an avenue to give all the new students some basic skills to use in the Fab Lab. Some basic engineering drawing skills were introduced. Then the students learned how to use Adobe Illustrator and SolidWorks. Once the students understood how to create 2-D and 3-D geometry, the students were able to use the Laser Engraver and 3-D printers. Students had built kit rockets earlier in the class to get the idea of rocket components. The students then built "scratch" rockets after they had gained some Fab Lab skills. Students were provided with only a body tube, and were charged with creating nose cones, fins and other rocket components. The students then assembled and tested their rockets for stability. Of course, the class concluded with a successful launch of the student's rockets.

The third session of the evening was a question and answer session. The group discussed specifications and thoughts on certain machines, policy and guidelines on public/community use of the labs, vendors for purchasing equipment and the stage of Fab Lab development for each group in attendance.

Moving forward, the goal of the group is to grow with participants and have other host nights. There was also discussion about professional development options. The idea of creating "build days" for low cost staff development seemed like a viable option.

If you would like more information about this group and how to share in their discussion, please contact Mark Beise at beisem@ricelake.k12.wi.us.

Sheboygan's Red Raider Manufacturing Sparks Interest in Advanced Manufacturing Careers

By Michael Dietrich, Business Development Executive, LAB Midwest, LLC

On October 18th, 2016 Sheboygan School District Superintendent Dr. Joseph Sheehan fired up a plasma cutter, sending sparks flying as he sliced through a steel ribbon and signaled the grand opening of the Red Raider Manufacturing Kohler/Johnsonville Advanced Technology Centers at Sheboygan's North and South High Schools. Among its students, the community's $5 million investment in curriculum and cutting edge industrial grade equipment is already sparking an enthusiastic interest in advanced manufacturing technology and a wide array of career pathways.

Red Raider Manufacturing is the culmination of five years of discussion, learning and planning involving the school district and its surrounding employers. "Some of the skills gap issues in our community existed because we weren't having conversations with our local employers," said Mike Trimberger, Principal of Sheboygan South High School.

Once the district initiated dialogue with employers, the two groups quickly came together developing curriculum that simultaneously opened up multiple pathways for students and addressed the soft and hard skills that employers believed were absent in the district's graduates. "We built relationships and curriculum around a mutual understanding of what was important," said Trimberger.

The initial focus was solely on curriculum and pathways. Once these were determined, it became apparent that the district's technical education labs, described by Trimberger as dark, dungy and dirty, would require significant improvement. One employer noted that if the district wanted to encourage students to not select a career pathway in manufacturing "they should come here."

Rather than independently determining what equipment should be incorporated in the new labs, the district relied heavily on its outside advisors, approaching local

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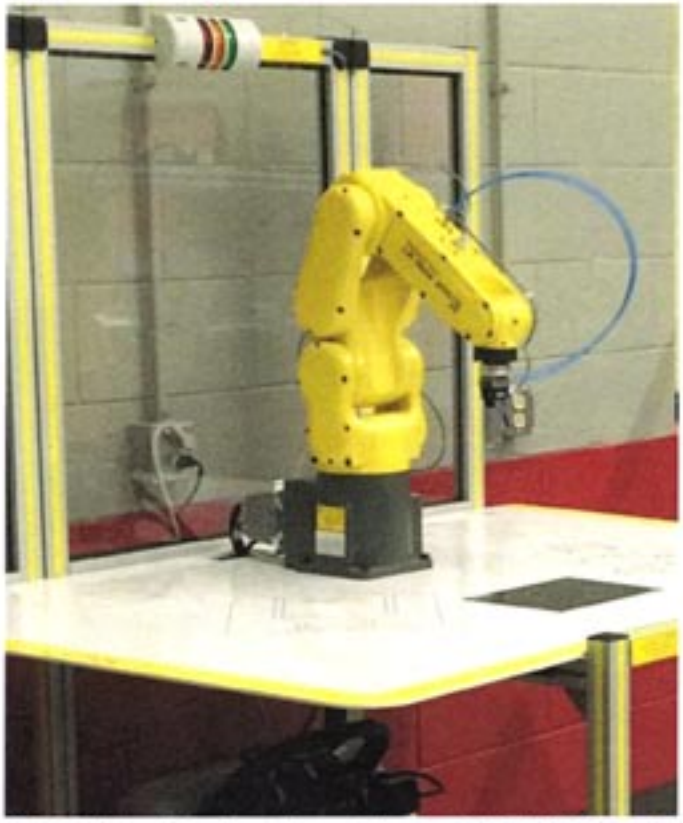
companies and Lakeshore Technical College to ensure that the new lab not only resembled a modern manufacturing environment but also mirrored the technology utilized by the regional technical college. Consequently the advanced manufacturing, welding, CNC machining, fabrication and automotive equipment found in Red Raider Manufacturing is a microcosm of local industry. It sends the message to students that a new era in manufacturing and industrial careers has arrived. "The kids walk by and see that when we talk about manufacturing careers, this is what they are," Trimberger noted.

One of the most unique aspects of Red Raider Manufacturing is its focus on advanced factory automation technology and skills. "Manufacturing isn't about screwing three screws into a manifold," noted Trimberger. "It's about operating the equipment on an automated production line. Skills like welding and metal fabrication are foundational. We need to take those skills and utilize them to operate and program robots that cross any sector, any area."



Red Raider Manufacturing utilizes a FANUC LR Mate 200iD Fenceless Certification Cart that can be moved from the Advanced Manufacturing floor to classrooms for use in instruction and hands-on learning on Robot Operation, Safety and Programming.

A student at Sheboygan South High School operates an industrial-grade FANUC M-10iA Robot with a teach pendant and controller that are identical to those used by many area employers. Delivering hands-on learning of authentic industrial knowledge and skills are a tenet of Red Raider Manufacturing's philosophy.

Each high school employs a large industrial style robot that is similar in size, functionality and brand to those used by a large percentage of local industrial employers, in addition to a smaller industrial grade fenceless robotic certification cell that can be transported to and from the manufacturing lab for use in other classrooms.

Trimberger repeatedly espouses the importance of listening to local employers in selecting the right technology. "If you had asked me what robot to buy I would have had a blank face. Instead we went to companies that use this technology and asked them what our equipment should look like. We wanted to incorporate something that resembles a modern manufacturing environment."

The $5 million investment in Red Raider Manufacturing included Visionary Sponsors Johnsonville Sausage, the Kohler Company and the Muth Family which owns Sheboygan's Muth Mirror Systems. The school district also stepped up as a Visionary Sponsor. They were joined by 39 other private companies and individuals who supported the effort.

Muth Mirror Systems' Chairman and CEO Ken Muth offers several reasons for his family's support of the project. "The reason we felt it was important to be involved in this project was a few fold. Our family has been manufacturing in this town since 1947 and community participation is important. We wanted to show students what a next-generation manufacturer looks like as their opinions may be outdated. High schools are a great setting for kids to get hands-on experiences with new equipment and to provide career development."

With curriculum and equipment now aligned with career opportunities in industry, the next steps are to ensure that students are taking the new skills and knowledge

gained from Red Raider Manufacturing and applying them outside the bricks and mortar of the school. According to Trimberger, there are employers who want to help students become lifelong learners. Connecting students with these employers though job shadowing, co-ops, and apprenticeships is a key aspect of Red Raider Manufacturing.

Red Raider Manufacturing's combination of curriculum, authentic equipment and emphasis on career pathways provides a blueprint for educators interested in partnering with local industry toward common goals. When asked if he has any advice for districts considering the pursuit of a similar path, embedded in Trimberger's response lies the true essence of Red Raider Manufacturing. "Don't go into any of this with a predetermined understanding of what you want to do. Let the process and the relationships build."

Matt Kirchner contributed to this article.

ARTICLE

Fab Lab 101 for Teachers at Three Lakes

By Steven Yahr, Three Lakes School District

While new to education and to manufacturing Fabrication Laboratories, or Fab Labs, are quickly becoming a powerful way to help students develop 21st century skills desired by employers. Recent research occurring at the Massachusetts Institute of Technology (MIT) is pointing to a new class of materials and new ways of thinking about production. Researchers at the Center for Bits and Atoms (CBA) are working on a new class of materials - programmable materials.

In traditional materials, like wood, metals, glass and composites, the intelligence to transform the material into the shape or function desired requires fabricating intelligence external to the material. For example, to fabricate railroad rail using industrial revolution production techniques, steel is shaped using a die, with the steel being acted upon by the die to form the rail. To fabricate a pair of shoes today, leather and other materials are acted upon by various tools to form shoes.

The promise of programmable materials is the ability to form material to new shapes and functions simply by using digital bits to program physical atoms, no traditional fabrication machinery is required. To make a pair of shoes using digital fabrication, the design for the shoes, as envisioned by the maker and expressed in digital bits in a computer, are used to program physical materials without the requirement for the need to cut material, or form material using external machining. The requirement for special tooling to form materials into useful objects has been removed.

In the same way that nature uses DNA to "program" the building of a new cell or a new organism, digital fabrication uses digital bits to guide the fabrication of a new object. In the digital fabrication, or "maker" paradigm, to perform a task the worker is in control of the making process. The hardware and software are support tools to the worker. The true promise of digital fabrication is the ability of an individual to make something for themselves that meets their needs rather than having to go to the store and purchase it. Just as people of an earlier age used tools to make things they needed, digital fabrication allows people today to make things they need, manufacturing for the market of one rather than the market of one million.

The research from MIT into "making" with programmable materials has spun off into a series of Fabrication Laboratories (Fab Labs). Fab Labs are places equipped with the latest in digital design and fabrication technology, where people of all ages and abilities can "make" almost anything of their desire to meet their local needs. Fab Labs are non-profit spaces in schools, libraries, museums, technical colleges and universities – to name a few! While all Fab Labs are similar in capability, as they all have similar hardware and software capabilities, what is made in them is very unique to local needs.

Fab Labs make possible a series of transitions for people. They are empowered, they are educated, they engage in problem solving in their local context, they create local jobs, and they invent new things. It is recognized that it often takes five years to become an expert in a specific domain, or fifteen years or more to grow a new scientist or engineer. Therefore, in Three Lakes, the Fab Lab model is introduced to students early in the educational process. Because it takes years to create an expert, a scientist or engineer, we start "making" when the young person first gets hooked on science and math in elementary school. Fab Labs recognize that it often takes time even to frame a problem in the right way, especially if it is complex.

The Three Lakes School District opened the first PK-12 Fab Lab in Wisconsin in 2014 with the help of a grant from the Wisconsin Department of Workforce Development (DWD). Students from Kindergarten thru 12th grade experience the joy of "making" through a variety of classroom experiences including our How to Make (Almost) Anything (HTMAA) and Marketing & Manufacturing elective classes. Wisconsin Technology & Engineering standards are used to guide the development of student experiences in the lab. Students use an engineering design process, from the Wisconsin Technology and Engineering Standards, to practice creativity, critical thinking, communication and collaboration while "making." Fab Lab Three Lakes is open to the public two nights per week with a number of clubs and individuals making things of interest to them. From the beginning, Fab Lab Three Lakes has hosted tours for other school districts, businesses and communities. During the summer of 2016, a two day Maker Camp was held in conjunction with the local Demmer Memorial Library for students aged 10 to 18. Plans are in the works for an expanded camp in the summer of 2017.

The Three Lakes district offers a two-week Fab Lab 101 for teachers who are opening their labs. During June

and July nine teachers from a variety of disciplines from art to CTE from the Northland Pines, Hayward, Bruce, Marinette, and East Troy districts and the President of Grow North Economic Development Corporation came to the beautiful north woods to experience "making."

The teachers came to the class with a number of expectations including how to use all the machinery in the lab, to incorporate the lab into their curriculum, to write curriculum, to experience "making" and others. Teachers used all materials that are used by students during the HTMAA course. After an introduction to the software and hardware tools available, as well as the engineering design process, the "making" began, and did they make! Students were often found in the lab late into the night engaged not only in their own "making" but also engaged with community members who were also "making." The volume and variety of "making" really became apparent in class photos taken on the final day of each class. And the teachers exceeded their expectations.

"My experience at the Three Lakes Fab Lab for Teachers is exceptional. The two- week course allowed time for learning the software and all of the equipment as well as the educational foundation of the Fab Lab. The instructors are experts in their field and continuously helped all students in the 'art of making.' It is truly an amazing experience and every morning I was excited to get back into the Fab Lab to start creating. At the end of the course I felt ready to impart the knowledge and experience to the other staff at my school," said Lori Puls.

"This has been a fabulous experience. The amount of knowledge gained was unbelievable. I would recommend this workshop to others who are looking to give students Manufacturing skills for the 21st century. Presenters were very knowledgeable and were willing to help solve problems and give much needed advice," added Mike Mass.

"I wanted to thank you and your fellow instructors for taking the time to work with our class to not only teach us the "how" of teaching in a Fab Lab, but discussing the paradigm some educators and parents will need to understand to make the Fab Lab experience a learning experience helping students face the challenges of our future workforce. I learned more than I expected. I am proud to say I live in Three Lakes Wisconsin where our school system is willing to adapt and learn new ways to help students of all ages learn. Because of this course I will be able to share an amazing "making" experience in my NORTHWOODS community and with the economic development professionals I deal with that are looking to continue to strengthen future economic development in Northern Wisconsin," commented Collette Sorgel, Educator, and President of Grow North Economic Development Corporation.

Fab Lab Three Lakes will be offering Fab Lab 101 for teachers again in the summer of 2017. To find out more information, contact Dr. Steve Yahr at syahr@threelakessd.k12.wi.us or call 715-546-3321, ext. 3242. Check out the wonderful things being made in the lab on FaceBook, look for Fab Lab Three Lakes.

ARTICLE

Innovation, Design, Engineering in Sheboygan Falls

The following article originally appeared in DPI-ConnectEd, e-newsletter of State Superintendent Tony Evers
http://dpi.wi.gov/news/dpiconnected
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Thinking like engineers means taking a project from concept to reality, with planning, creativity, collaboration, and problem-solving in between.

Sheboygan Falls' new Innovation and Design Center is part of a K-12 effort to help students "think like engineers."
Photo: Sheboygan Falls School District

Going beyond the limited benefits of specific technical skills that may be needed right at this moment, the overarching ability to think like an engineer will benefit students and the workforce for many years to come, through industrial sea-changes and technological advances.

That's how Jean Born sees it. The superintendent of Sheboygan Falls School District, she's been in discussions with educators and business partners for about three years on how to improve engineering and manufacturing education in the district.

Rather than limit discussions to a few technical courses at the high school level, the district expanded its vision to implement a K-12 curriculum to help students learn to think like engineers.

Beginning at the elementary level and continuing through high school, kids in Sheboygan Falls learn about the thinking, planning, and doing that goes into creating a product.

Project-based learning, maker spaces, STEM education, and the FIRST Lego/FIRST Robotics programs help achieve that goal. Community partners from local businesses talk to students about real-world applications.

Another key piece is enhancing off-site, experiential, work-based learning.

The district unveiled, this fall, a new Innovation and Design Center in a room which used to be the high school auto shop.

To start, this room will be a place for high school students to apply their engineering thinking in a hands-on way – conceptualizing, planning, and creating things that didn't formerly exist.

The new center will allow the high school to offer a Computer Aided Design and Engineering class next fall for the first time. Students taking the STEM Geometry class will also be using the equipment in the lab. And members of the county-wide robotics team, which is hosted by Sheboygan Falls, will be using state of the art robotics equipment to build their projects.

Reporters, local officials, and community members toured the gleaming new facility at the ribbon-cutting.
Photo: Sheboygan Falls School District

Other engineering classes will be added later, and eventually, younger grades may also use the facility.

Starting with computer-assisted design and moving all the way into creating something is quite an attraction, according to Sophomore Raymond Kulow as quoted in a story by WHBL radio. Kulow thinks the new facility will help students connect with good careers they enjoy.

"They'll learn how to make stuff in computers, and they'll see how it comes from what they make on the computer into a part, and it'll be something they physically can hold," he told WHBL.

One of the highlights of the new lab is a 33-ton plastic injection molding machine, identical to ones used in industrial facilities, that comes to the high school through a partnership between the district and a local partner, Bemis Manufacturing Company. According to Milacron, the machine's manufacturer, this is the first time this exact unit has ever been used in a high school.

Bemis and Sheboygan Falls have worked together before including collaborating on a highly successful summer externship program for teachers where educators spend a week touring Bemis and its suppliers and learning more about the manufacturing process and the types of careers available there.

The 33-ton plastic injection molding machine by Milacron. First of its model to be used in a high school.

Photo: Sheboygan Falls School District

Over the summer, teachers of science, mathematics, engineering, and technology education got together to create curriculum integrating the Innovation and Design Center into their courses.

State Superintendent Tony Evers attended the design center's ribbon-cutting, and commended the approach. Evers has often commented on the educational power of learning to "think like" a professional in a given field. He also noted that Sheboygan Falls is lucky to have a large number of local companies who partner on curriculum and equipment needs.

At the district's invitation, State Superintendent Tony Evers visited the Innovation and Design Center for an official ribbon-cutting, along with a number of other community partners.

Photo: Sheboygan Press

ARTICLE

The WTEA Promotes Teaching as a Career at Green Bay "Find Your Inspiration" Event

On Thursday, October 13th, the WTEA had a presence at the "Find Your Inspiration" event held at the Green Bay KI Convention Center. This event was put on by the Greater Green Bay Chamber Workforce Development branch. Its goal was to give nearly 4,000 8th grade students a hands-on career exploration experience directly from employers throughout the Greater Green Bay area. In addition to students, there were approximately 300 teachers, counselors, parent chaperones, 100 volunteers, and over 120 exhibitors. The WTEA booth was sponsored by the NEW Manufacturing Alliance. A special thank you to Ann Franz for helping to coordinate this event for the WTEA.

The WTEA booth promoted Technology and Engineering teaching as a career. The booth was filled with students the entire day and the WTEA staff had many good discussions with them. The poster below was created to promote our field. The WTEA members also had a chance to promote our organization with the many companies on hand at the event. All the companies were struggling to find enough highly skilled, highly passionate, highly knowledgeable employees. The WTEA plans on having a presence at another similar event in March in Appleton, held by the Fox Cities Chamber. Please consider helping to promote teaching at a local career fair or other venue in your area. The WTEA can help with this.

If you would like a digital copy of the poster to print for your classroom, please email Steve Meyer at smeyer@brillionsd.org.

Hello! I attend Franklin MS I loved how helpful and polite your representatives were. I might end up taking a computer science class or a computer repair class. Anyway thanks again for giving my peers a great experience!

Dear Tech Ed Teachers,

I attend West De Pere Middle School. I liked the guitars! I would probably take Tech Ed. in highschool to pursue this career!

Thank You,

Thank you for doing that presentation. I liked the interactive activities. The technology engineering was the coolest thing. All of the was cool

"Find Your Inspiration"

October 13, 2016

I attend Franklin Middle School. I liked the Wisconsin technology education association the most I liked when they was telling me I can find a way to take apart a phone I am going to take a technology and computer science class in highschool. Thank you for letting us come visit.

Thanks.

Dear WFEA.

Thank you for teaching me about Technology Education and how important it is in our lives. I really enjoyed playing the "board guitar" and learning about how it was made. We have a Tech Ed class at West De Pere that I take and it is very interesting and I could possibly see myself doing something related to that in the future.

Thanks!

ARTICLE

Trebuchet Project Well Suited For Principles of Engineering Class

By Matt Schultz, LakeviewTechnology Academy

Project Lead the Way's Principles of Engineering needs to be more than just Power Points and complicated math formulas. It needs to be applications - applications that utilize the complex formulas and put to work the information given in the presentations. As a teacher, I constantly struggle with the moral dilemma of sticking to the PLTW curriculum, which I barely have enough time to get through, or providing my students with a rich and meaningful experience that will solidify the information and give them an experience they will never forget. You might remember a few years back, I incorporated Under Water Robots (ROV) into my POE Class, tying every unit to an aspect of the ROV. This year I have a great, fantastic, motivated and skilled group of students that I wanted to try something similar with. While at Union Grove High School for a visit on behalf of the WTEA, I met an instructor whose class built a trebuchet and competed at the Racine County "Pumpkin Chuckin." I was fascinated by his students' work and excited to make an attempt with a group of my own. When the schedule came out this year and I noticed that I was again teaching POE, I thought this would be a great opportunity to incorporate into the Kinematics Unit.

After the class went through the curriculum, we decided we need to investigate a few more formulas related to trebuchets. We researched different types of trebuchets and selected multiple designs we wanted to attempt. I split the class into six groups of four, and assigned them each a different trebuchet to design and build a prototype, with the idea in mind that we would select two from the six and build a large one for the competition. Time was of the essence. We had six weeks until the competition. My thoughts were to dedicate two weeks to prototypes and four weeks to the larger trebuchets. As a teacher I planned two weeks for planning and building. It took more than two weeks to build the prototypes. In fact, it took four weeks to finish and test them. With two weeks until competition, I was very skeptical that we would be able to finish them on time. After we wrapped up the scaled trebuchets, I spoke to the class honestly about my concerns. My idea was that we would build one, and if we could make it to the competition, great. If not, we could always make an attempt next year. The class wanted to build two, and they wanted to compete. I told them if we start this, we were going to finish it, and it may require staying after school and coming in on the weekends. They all agreed and we dug in. We decided to build a "Floating Arm or F2K" and a "Merlin." The F2K is a pretty popular style trebuchet, while the Merlin is a bit different.

The next two weeks were incredible.The students came in during study halls, stayed late into the nights, came in Saturdays and kicked total butt. I was beyond impressed with everyone's team work, organization and follow through, as well as their efforts and willingness to work inside and outside of class. We broke up every aspect of the trebuchet into small tasks for twelve members. We had a team building the frame, a team cutting out gussets on the plasma table, a team making the sling, a team making the adjustable firing angle, a team making the weights, and a team making the arm, and most impor-

tantly, a safety team. All of them worked together like a well-oiled machine. These two weeks were amazing for me as a teacher to watch my students so engaged, so excited and so dedicated to the completion of the project, as well as learning so much about leverage and firing angle.

The competition weekend was approaching and we hand not even fired a single pumpkin. We stayed late Thursday night and made our first attempt. Before the launch I did one final walk around to make sure that everything was safe and in check. Before I gave the okay to launch, I took one final look and noticed that if there was a misfire that the pumpkin would shoot right back into our school through the large overhead door where we were standing. So I ordered them to re-position the machine so if it were to misfire, we wouldn't be cleaning up pumpkin guts in the lab. Good thing I did because that first pumpkin went straight back and exploded on the outside wall of the school. The students burst into laughter. We analyzed that our firing angle needed to be adjusted to release later in the rotation and set up for our second launch. The second launch went much better. For the next two days we frantically worked to iron out all the wrinkles. We fine-tuned our launch team procedures and Saturday one hour before the completion we loaded up the two trebuchets and headed to the fair ground. We pulled up, not late, but not on time with a crowd of hundreds watching us unload and set up. The kids were great, they worked as a team to unload the machine and prepare for launching. After thirty quick minutes of unloading and set up, the two teams began to launch and the crowd loved it. Our furthest distance was 180 yards shot by the F2K. That was good enough to take First Place in our class. The kids were pumped.

Reflecting on this unit really put things into perspective for me. My moral dilemma to stick to the curriculum and not stray off is no more. I provided an enriching learning experience that put to work the formulas and the theory. My kids loved the project, learned far more than I could have ever hoped, and had an experience that they will never forget. Those two weeks were some of the most enjoyable times I have ever had as a teacher. Every day in class we worked hard, we laughed, we learned, and we worked together. It was a blast. It is times like these that make me continue to think I have the best job in the world. I strongly encourage us all as educators to follow our gut and take a gamble in our classes with our students. We are all professionals and know how to motivate our kids. The class was exceptional. We got through all the curriculum with three weeks to spare and are now making two radio controlled barges for Gateway Technical College. We partnered up with the freshwater science people at GTC and are making a water apparatus that will use a powered winch to raise and lower a data collecting module into freshwater. We are left with only three weeks to take on this enormous task. I am pumped to see the kids perform like champions again.

ITEEA's 79th Annual Conference

ITEEA Keynoter to Address "4cing The Future of STEM"

ITEEA is pleased to announce Jonathan Gerlach as its 2017 Dallas Conference Program Excellence General Session keynote speaker. Gerlach is the International consultant for STEM education initiatives at Discovery Education.

Jonathan has a deep background in STEM, including a certification from Columbia University Teacher's College in STEM Education with a distinction in STEM Education Leadership, which he utilizes while providing his expertise in STEM Education, curriculum development, professional development, coaching, and school culture transformation to school districts globally.

As an Albert Einstein Distinguished Educator Fellow, he worked in the U.S. Senate focusing on STEM education policy for the office of Sen. Michael Bennet [CO]. As a former NASA Endeavor Fellow he collaborated with teachers and leaders around the country as well as professors at the Columbia University's Teacher College in understanding the impact of STEM professional development. Jonathan previously supported STEM education in Hillsborough County Public Schools as a district level science resource where he was named the Florida Association of Science Teachers Science Teacher of the Year as well as the Florida Engineering Foundation STEM Educator of the Year. Jonathan is considered a leader in STEM education and has authored multiple publications on the topic including "All Teachers are STEM Teachers" in EdWeek, "STEM: Defying a Simple Definition" and "Talking SMath" in NSTA Press as well as "Elementary Design Challenges" in Science & Children. His work on elementary engineering education is also highlighted in Integrating Engineering and Science. As a thought leader, he has spoken at multiple national conferences for STEM education, science education, and educational research as well as keynotes at numerous STEM events both nationally and internationally.

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