

The **MassTEC** *Express*

E-Newsletter

Massachusetts Technology/Engineering Education Collaborative, Inc.

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New England Crisis National Tragedy

Just when educators and politicians are beginning to realize that bubble testing does not prepare students for college or careers, there are fewer colleges and universities offering Technology/Engineering Teaching degrees.

Here in New England, only three state schools — Fitchburg State University, Central Connecticut State University, and Rhode Island College — still have undergraduate degrees. None currently offer an MS in the field.

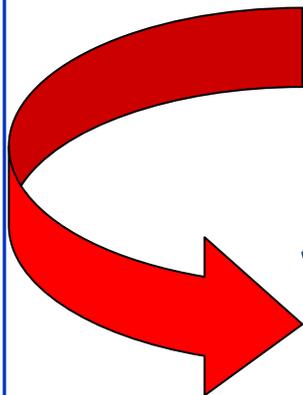
Since the average age of Technology Engineering Education teachers is above 50, there is a severe shortage of people who are certified to engage students in authentic learning experiences in hands-on, minds-on, life changing ways. Here are some fully online options for those who want to earn a masters degree in Technology Engineering Education:

Valley City State University, N.D.
<http://teched.vcsu.edu/>

North Carolina State University
<https://distance.ncsu.edu/programs/master-of-education-in-technology-education>

California University of Pennsylvania
<http://www.calu.edu/academics/online-programs/me-tech-ed/>

Ball State University
<http://cms.bsui.edu/academics/collegesanddepartments/technology/academics/onlinedegree/mateched>



Your article could be here!





Greetings!

Lots has been happening since our last Express. Maybe some of you have noticed that there are fewer issues of the **MassTEC Express** this school year. There are several reasons: ennui, job searches, and too many Stuart Woods novels. However, one of the biggest reasons is that we need articles from great teachers and thought leaders like you to let us know the amazing things you are doing or could do if you had the support you need. Contact us anytime if you have an idea, a story, a link or even a picture to share your passion in this great field we are in: Technology Engineering Education.

I know how hard it is to get excited to write an article after a demanding school day. I recently got back to teaching high school Technology Engineering Education in north central Connecticut. I taught in higher education at the doctoral level for the past six years. Teaching high school students is a great ego leveler: between some youths' thoughtless rudeness and the addiction to

their cell phones, it is a challenge to get some young people interested in doing anything. However, there are amazing young designers, engineers, and hands-on learners who challenge what I know, how we perceive our reality, and how we as a species might deal with the big problems of our future. I am sure I am just going through the "This next generation is going to hell..." feelings that all older generations have felt. On the other hand, some of young women and young men are taking on authentic learning, problem solving with tools and materials (technology), and are working to find smarter ways to do things but, more importantly, finding their own best selves. You know, I still love this part of teaching; seeing the 'eye pop' and enjoying the glow of success when a student comes to new understandings of her skillset and self-worth.

Educators know that we do not teach for the money. We know that we could make more money in other fields. We

could have more time for leisurely activities...oh, but that eye pop! So let's hear from you out in the field of education. Share your ideas, passion, successes and failures and rediscoveries. We need to support each other in this magnificent endeavor—teaching.

Please check out the original articles as well as news on the ITEEA conference in this issue. The president of the MassTEC board explains where we are in the new standards. A professor from FSU challenges your students to care about their future and participate in a robotics competition. A retired engineer wants your input on his idea to offer afterschool technology and engineering experiences. And a high school teacher spells out how he uses a robotics challenge as a capstone project for his seniors. All this and more in this issue of **The MassTEC Express**...

Thank you for all you do!



Dr. Ray McCarthy
The *MassTEC Express* Editor
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RSA ANIMATE How To Help Every Child Fulfil Their Potential



**Start Planning for the 2016 MasSTEC
Conference!**

<http://www.masstec.org>



Marlborough-

Message from the President

Greetings!

There will be no changes in the 2016 or 2017 Science and Technology/Engineering (STE) MCAS exams. That is the latest word from the Massachusetts Department of Elementary and Secondary Education. A timeline for implementation of the 2016 STE Standards is anticipated later this spring. Although the new standards will not appear on the STE MCAS until at least 2018, the DESE advises that the Science and Engineering Practices (see below) be used to ensure that the students "do science."

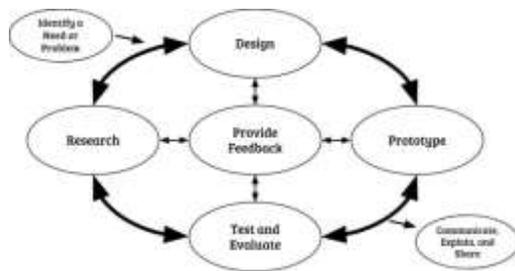
While the DESE has not finalized an implementation plan, it is anticipated follow a two year cycle where the MCAS is focused on comparable standards (2006 and 2016) in the first year and additional standards in 2016. How the old and new standards relate to each other can be seen in the "Crosswalk" document at the link below.

The final version of the 2016 MA STE Standards is available at: <http://www.doe.mass.edu/stem/review.html>

Also available at the above link is the Draft of the 2016 MA STE Curriculum Framework, which is all the supporting information, including the Science and Engineering Practices and the new graphics for the engineering design process and scientific inquiry. A final version will be published this spring.



Engineering Design



Scientific Inquiry



Science and Engineering Practices

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Another important link, at the above address, is the "Crosswalk of the 2001/2006 STE Standards and the Draft Revised Standards." This document will soon have minor updates but is accurate enough to use for comparing the old standards to the new standards.

Thank you for all you do!

Mark Kobel
 President MassTEC
presidentmasstec@gmail.com

Technology/Engineering Education: the T&E of STEM!



Fitchburg-

Fitchburg State University Technology/ Engineering Education

It has been a very busy and productive semester for the Technology/ Engineering Education program at Fitchburg State University. On March 2-4, ten students representing the Fitchburg State Chapter of the Technology Engineering Education Collegiate Association attended the National Conference held in Washington DC. The Students participated in the Transportation, Problem Solving, Communications and Technology Challenge competitions. Fitchburg State came in second place in the Communications contest and third place in the Technology Challenge. Photos are available on the Fitchburg State TEECA Facebook web page (<https://www.facebook.com/FSUTEECA>). Also Dr. James Alicata was awarded and recognized as TEECA Advisor of the Year.

On March 29, 2016, elections were held and the following new chapter officers were elected: President – Shannon Belski, Vice President: Corey Coleman, Treasurer: David Hilton, Secretary: Tara Dupuis.

Robotics Day on Thursday, April 7, 2016 at 12:00 p.m. at Fitchburg State University.

The TEECA Chapter will be hosting a Robotics Day on Thursday, April 7, 2016 at 12:00 p.m. at Fitchburg State University. Local high schools are invited to attend and participate in the planned events. Additional

information is available on the Fitchburg State TEECA Facebook web page (<https://www.facebook.com/FSUTEECA>).

The Industrial Technology Department and the TEECA chapter will be hosting the second Technology/ Engineering Awareness Day at Fitchburg State University on Friday, October 21, 2016. This event is planned for high school seniors to learn about the opportunities in Technology/ Engineering and the programs that Fitchburg State University has to assist them pursue their interests.

More information will be coming in the future. The Industrial Technology Department and Technology/ Engineering Education program is exploring the possibility of offering a graduate course in Technology/ Engineering Education to be offered in a hybrid format. This course will provide students with an opportunity to complete the course on –line yet have the opportunity to participate in hands – on activities on two Saturday sessions.

For more information regarding these programs, please check the Fitchburg State TEECA Facebook web page (<https://www.facebook.com/FSUTEECA>). Please share this web page with high school technology engineering students, there are updates regularly that could be of interest to them.

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ROBOTICS SHOWCASE



iRobot

FITCHBURG STATE UNIVERSITY

AUTODESK

Join the Fitchburg State TEECA Chapter in talking about technology, learning about STEM, getting hands on with some robots, finding out ways that you can get involved, and much more! Everyone is welcome!

Thursday, April 7th, 2016
Antonucci Science Building
12-4PM

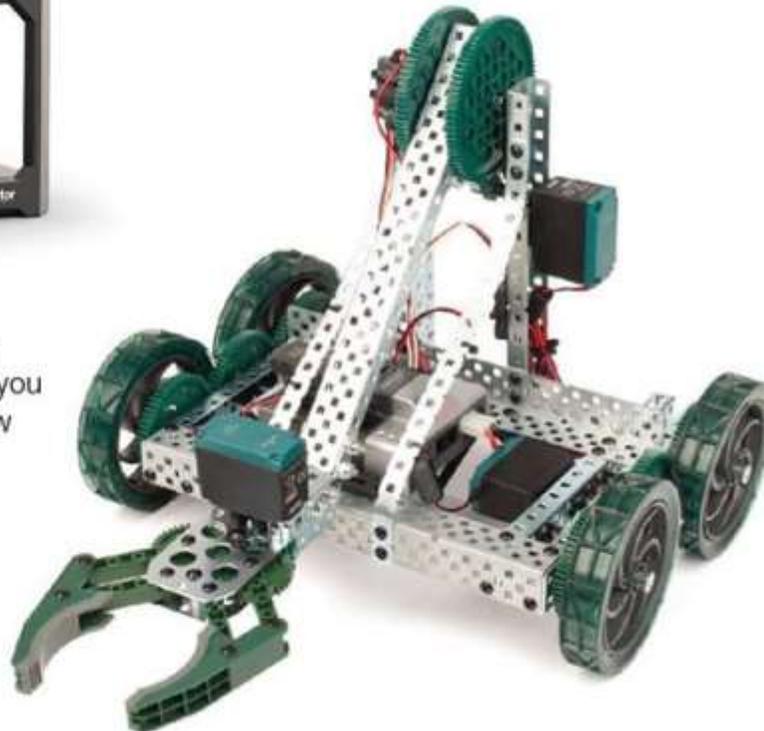


Already know about robots or have something tech related you want to show off? Let us know and take part!

Email us at

fsutecca@gmail.com

 FSUTECCA



**Plan on Applying
 For
 POY and TOY!**

<http://masstec.org/recognition/index.htm>

Norwood-

Reverse Engineering or Backward Curriculum Design

This Capstone Project could drive your program, unit, and lesson outcomes.

In my Engineering-1 course at Norwood High School, on the first day of class each September, I describe the capstone project for this course as an example of how a Reverse Engineering or Backward Curriculum Design approach is used to guide a year-long Engineering-1 course. For their Engineering-1 Capstone Project, my students must design and build a Mars Pathfinder-style Rover that will leave Norwood High School on its own power, and travel through a 1 mile outdoor course, while maintaining continuous forward progress, and using the least amount of power possible. The Rover vehicle that completes the 1-mile outdoor course, while maintaining continuous forward progress, and using the least amount of power, will win the technology Olympics event held at Norwood High School each May.

The students don't actually start to build their rover vehicle until February 1st of each year, because, from September 1st to January 30th, we study each of the seven areas within Engineering, in detail, in class. The students are then required to apply the principles studied in each of the seven areas of engineering, to the design of their rover.



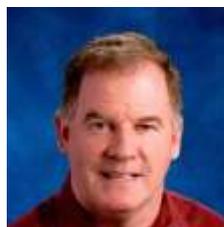
The Reverse Engineering or Backward Curriculum Design is put to work by me, the classroom teacher, when I remind students of the challenges they will face when designing their rover vehicle, as they are learning the key concepts from September –January. I have found that in a college-level Engineering-1 course, the students may need some assistance in selecting the type of gear ratio they will use to drive their rover vehicle. I use Inquiry to have the students arrive at the correct answer on their own by suggesting that they consider what the load status will be on the vehicle as it travels down the long hill out on the course, and, then, comparing what the load status will also be when it comes

up the same hill, on the return trip. In a nutshell, the load status will be greatly reduced when the rovers go downhill, and greatly increased when the rover is going uphill. Most college-level students opt for a gear ratio that produces a little bit of torque, while not giving up too much speed.

In my honors-level Engineering-1 students are required to design and build an “on-the-fly” transmission that will allow them to switch between speed and torque ratios out on the course on the day of the Technology Olympics. This requires significantly more planning on the part of the students because they need to make sure the gears are spaced far enough apart that they won't have two different gear ratios trying to apply at the same time. In this honors-level example, the reverse engineering or backward approach to curriculum design is used, but a significantly higher level of cognition is required of the honors-level students because they have to consider multiple variables when designing their on-the-fly transmission, unlike the students at the college level. This is an excellent prototyping exercise which usually leads the honors level students to develop several versions of their on-the-fly transmission, before settling on a final design.

Principle in Practice

In order to win our Technology Olympics event, the rover has to use the least amount of power, compared to the other rovers. This is another example of how a capstone component can drive the entire course. Students will use the electrical engineering principles learned back in September to reduce the overall current draw of the rover. The students use math to predict how much current draw they believe the rover need to overcome friction as the rover is in motion. They then reduce the weight of the rover vehicle and re-measure the amount of running current in order to study how the vehicle's weight contributes to how much current the rover draws. The answer: A higher vehicle weight usually results in higher current draw because you need more current to get the vehicle into motion from a standstill. I then have the students repeat the same running current draw test using a gear ratio built for speed compared to a gear ratio that is used to produce torque. When the students complete this task, they see that the vehicle using the gear ratio used to produce torque draws less current, because the loading on the motors is greatly reduced when you use a smaller drive gear driving a larger driven gear.



Dr. Michael Crowley
mcrowley@norwood.k12.ma.us

The Kindle version of Dr. Crowley's book entitled: [“Motivating for STEM Success: A 50-step guide to motivating your students for STEM success”](#) can be downloaded at Amazon.com

Framingham-

Project Academy

Editor's Note: MasSTEC Board member, Bill Wolfson, is asking your help in editing and refining his idea for a Technology/Engineering related after school program. Please check this out and send comments and suggestions to billwolfson@gmail.com

Project Academy... an after-school program starting summer 2016

Although most MasSTEC teachers use a project based learning in their classes, my contention is that present education leaves many students not engaged in learning and finding it difficult to manage the complexities of life relating to the interface of society, school and business.

Our after-school program will provide a fun environment around interdisciplinary project based learning for charter schools, public high schools, home schools and drop outs. We will provide the missing skills like problem solving, creative and critical thinking, questioning, meta-cognition reflection, character development, business processing, financial literacy and societal values needed to succeed in today's environment.

The school will focus on the following skills with learning happening using project based

activities in a collaborate environment:

- Problems solving
 - Collaboration
 - Innovation & Entrepreneurship
 - Thinking skills (critical and creative thinking, questioning, reflection)
 - Character skill development
 - Financial literacy and business skills
 - Quality processing and measurements
 - Learning using assessment and feedback
 - Brain plasticity
- Web tools for blogging, portfolio management and presentations

Our Mission:

- Get students excited about learning (life-long learners).
- Have the reasoning skills to manage in today's society and begin to build a set of skills to use in multiple careers.
- Understand that problems are opportunities. The bigger the problem, the bigger the opportunity.
- Have students better prepared for college or a career.

Uniqueness of the program:

- Teachers do development/ assessment and research on learning
- Organization structure is non-silo based
- Students are involved with their own

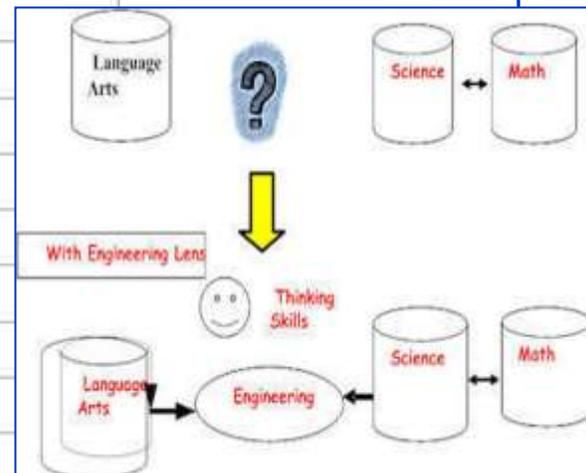
Implementation:

Areas of discussion ...can be tailored to local needs such as the local community food needs.

↑ ↓	See the problem/Bug
	Frame it
	Research
	List possible solutions
	Pick a few
	Select
	Test
	Reflection
	Present solution

The course will be done with hands on learning using methods from WPI/engineeringlens.org

- Feed the World
- Heal the World
- Clean the World
- Power the World
- Respect the World
- Connect the World
- Entertain the World
- Sports of the World
- Music of the World
- Record the World



assessment to judge projects and their learning

- Focus on students strengths
- Learning by developing solutions to real issues verses a scripted approach
- Focus on stretched goals/objectives
- A culture of support for the students

Our student teams will work on problem of their choose using the implementation design process as shown below:

The design process will take many weeks with the team forming their rules to work together, build a project plan, connect with out-side organizations (community. business) to work with and seek guidance as needed. The results will be presented to the community at the mid-point and end of the project.

What are the learning outcomes?

By the end of this course, the students will be able to:

- Clearly articulate the nature of the design process & problem solving
- See the “World” as a place of excitement and inspiration
- Use assessment strategy and feedback as learning tools
- Use of relevant soft-skills in their life to connect with society
- Begin the steps to become a lifelong learner
- Have taken steps for self-control in their interface with others
- Understand the processes within a business and personnel finance
- Understand that problems are opportunities in life
- Build on their strengths and skill sets
See errors as a learning point on what not to do in the future

The teachers as the facilitator:

We need to focus on modeling for the students the way to ask questions based on the desired outcomes to demonstrate that learning is achieved by getting the students to understand

how they gathered the data & use skillful thinking to make a conclusion.

In addition, we need to model the meta-cognition aspects on how we arrived at a learning point. By providing examples & engaging students in role playing, we can demonstrate how we arrived at a particular point.

The teacher will be able to identify the expected outcome and question the students on how they achieved this outcome. In addition, the students will assess themselves on their compliance with the ground rules that were established in the beginning of the project.

The goal for the teacher is to create an environment that supports learning and construction of knowledge by the student. **It is not about teaching but student learning.** There is too much data to know it all.

Open Issues: (looking for feedback)

- Length and time for the program....presently thinking 16 weeks and 8 hours/week. Other options?
- How to partner with school districts
- Building relationships with the business community to use their software and hardware tools
- Creating a pipeline with businesses for internships
- How to get the community involved
- Finding funding and founding partners for this process

Thank you in advance.

William (Bill) Wolfson

billdwolfson@gmail.com

<http://www.integratingengineering.org/>

Framingham, MA



Do the [MasTEC Math](#): There are 9 active board members, 4 are retired Technology Education teachers and Engineers... We could have up to 20 members on the Board of Directors... How many of you do we need to volunteer 3 hours per month to support our discipline?

Reston VA.-



Learning by Doing Project

Please help us gather information for the Learning Better by Doing study, here is the link to that study:

<http://www.iteea.org/Activities/2142/>

[LearningbyDoingProject.aspx](#)

If you would send it out to all of your technology and engineering teachers we would appreciate it. Also - if you could get some science and mathematics teachers to complete it too, that would be great.

Please let me know if you have any questions.

Thanks again,

Johnny J Moye, Ph.D., DTE
johnnymoye@gmail.com

Wales, ME.-

A Note from Down East

Dr. McCarthy,

I wanted to first thank you for sending this letter to the Maine Tech Educators and allowing us to read what you have. It is an exceptional newsletter and filled with an abundance of resources and information for all subject areas.

I am a graduate of Natick High 1970, yes I'm am on "plus" end of my career as an educator. However every year my freshman continually ask me to stay till they will graduate, and repeat that request all the way until they do graduate. Makes me one proud teacher. My career as a student in Natick brought me through the Industrial Arts era, into Engineering, and into the Technology education era of today. I have been an educator for forty plus years and enjoyed it throughout, even with the administrative frustrations that happen every year.

Our program at the university has disappeared. My students now look to Fitchburg for their training when we have them showing interest in Tech Edu. I currently have one young lady who is at our local Voc Tech college and is currently requesting to change to Fitchburg in the fall of 2016 to start her Tech Edu training.

Again, thanks for the newsletter! I have printed the "membership" form out and will fill it out this afternoon

and send it out with my payment. I hope more issues will follow.

Thanks for reading about my "life" in teaching, or at least a little bit of it.

Respectfully,

Lawrence "Mac" McCarthy
 Career & Industrial Technology Education
larry.mccarthy@rsu4.org
 Oak Hill High School
 Wales, Maine 04280

My Response

Hey Mac! (Great name by the way),

Thank you for your feedback. Please consider writing an article from 'down east' to share what you are doing up in Wales (203 miles from where I live).

Also,

See if you can get a professional day on Friday, October 21, 2016 for the annual MassTEC Conference at Fitchburg State University,

Let's talk soon,

Ray (Dr. Mac)

And

Since only Massachusetts (MassTEC) and Connecticut (CTEEA) have the only Tech Engineering conferences in New England, please consider venturing to these great opportunities to gain knowledge, skills, friends, and support for the discipline that you love: Technology Engineering Education!



Do the [MasSTEC Math](#): There are 9 active board members, 4 are retired Technology Education **teachers and Engineers...** We could have up to 20 members on the Board of **Directors...** How many of you do we need to volunteer 3 hours per month to support our discipline?



National Harbor, MD-

Annual Conference Reflections

I love the excitement of the ITEEA. Ever since 2000, I have looked forward to seeing what others around the country and around the world are doing to engage their students in great learning opportunities. Yes, there are vendors and excellent speakers but, for me, the really interesting part of the conference is the networking and idea sharing with people who love what we do.

This year I discovered that China was formulating its national hands-on learning education based on ideas generated at the ITEEA. Also, teachers in Australia and New Zealand have all sorts of obstacles to connecting with their students: one school in eastern Australia has students in an land area the size of Massachusetts. Furthermore, teachers in Europe are grappling with student engagement just as we are in New England.

The workshops offered by teachers for teachers always draw me in, There were several based on the

idea of STEAM education in which the humanities are incorporated into the hands-on experiences intentionally so that students can understand how history, philosophy, social studies, the arts. Language arts and culture all effect how technology and engineering is applied to supply answers to their **society's needs and wants. Several of these STEAM ideas were after school or as a part of a library experience. I still feel that Technology Engineering education should be central to all students' education** in that here is where all the other subjects get connected with real life.

Another focus of the workshops and the vendors is rapid prototyping. I know that this seems to be a hot topic now and public school administrators seem to be excited by this technology. I recently began teaching in a school system that takes this 3-D printing very seriously. I agree that it can offer great **challenges to students and yet it is not the 'silver bullet' that some make it out to be. Indeed, the rapid prototyping is just one more arrow in the quiver of a good teacher.**

The highlight of the conference is the celebration of the Programs of the Year and Teachers of the Year from around the country. This year it was especially fine to see one of our own — Gary Blanchehette of Ottoson Middle School from Arlington Massachusetts — receive his award at the ITEEA.

There is still time for you and your department mates to apply for the [MassTEC Teacher of the Year and Program of the Year!](#)



One last thought: the MasTEC

Board has voted to help finance two board members' trips to the annual ITEEA Conference. This year, only one member —me— was able to go.

This is one more reason to join the MasTEC Board! If you never have been to the ITEEA, you should. It is a career enhancing, life changing event. See you there next year.

Ray McCarthy, EdD
ray.mccarthy.masstec@gmail.com

*2016 Program of the Year
And
Teacher of the Year*

This could be you!

Plan to apply
this year!



MassTEC

- * Program of the Year
- * Teacher of the Year

Apply or Nominate Today!

Marlboro-

POY—TOY 2016

All applications need to be submitted no later than Friday, September 2, 2016

MasTEC is offering two recognition programs for technology/engineering teachers: Program of the Year, and Teacher of the Year. The recipients of Teacher of the Year, and Program of the Year will receive a plaque.

The top two finalists of Teacher of the Year will receive a free MasTEC membership, admission to the following year's MasTEC conference and a year's membership to ITEEA. The top two

finalists of Program of the Year will receive a free MasTEC membership and admission to the following year's MasTEC conference. The award recipient (s) will receive a one year membership to ITEEA for up to 3 members of the department. All applications need to be submitted no later than Friday, September 2, 2016

The recipients for the Teacher of the Year and Program of the Year will be eligible to submit an application to the International Technology Education Educator Association (ITEEA) for consideration for the ITEEA Teacher Excellence or the Program Excellence Awards. These awards will be presented at the ITEEA annual conference. I ask you to think about applying for one or both of these awards. For additional information and an application for either of the awards please go our web site and look under Recognition Consider Applying for Program of the Year and Teacher of the Year. This section is located on the left side of our web page.

<http://www.masstec.org/teacher-of-the-year--program-of-the-year.html>



MORE at

<http://www.masstec.org/>



Massachusetts Technology Education/ Engineering Collaborative

Cool Links!
For more go to <http://www.masstec.org/>

10 techniques to ensure that your lessons are as dull as dish water



Alive Inside

<https://www.youtube.com/watch?v=laB5EgejOTO>



Alive Inside Official Trailer 1 (2014) - Alzheimer's Documentary HD



Hands-On Learning vs. Lecturing

By Katie Ash on January 20, 2010 11:30 PM / 10 Comments

[Twitter](#) [Facebook](#)

A new study by Purdue University has shed some light on how to most effectively engage students in technology and engineering at a young age.



Great Sub. Plan!

Our old banner has served us well; now we are looking for a new one to kick off our efforts in 2016.

MassTEC Banner Contest

Let your students' (and teachers') creativity flow!

Design Brief:

Create a great new Banner for MassTEC

There are two divisions for this competition:
Middle School and High School.

Banners will be created by teams of two (2) students.
A school may have as many teams as they wish.
Student teams may submit up to three (3) designs.

Constraints

- Your digital poster
- Must be 60 inches tall x 36 inches wide
- Must be a JPG file
- Must contain the MassTEC Logo
- Must be in RGB format

Win!

Students and their teacher win MassTEC T-Shirts and free admission to the 2016 MassTEC Conference on October 21, 2016.

Due Date: May 10, 2016

Submit your digital designs to:

masstecbannercompetition@gmail.com



Old Design



Small print: The MassTEC Board will own the copyright to any submission and will judge the submitted banners.
The MassTEC Board decision on the two winning teams will be final.