

STEMATHON

A CELEBRATION OF STEM IN PENNSYLVANIA

From compelling sessions to interactive experiences, STEMATHON offers a collection of opportunities for STEM education professionals at every level to collaborate, learn, and find inspiration.

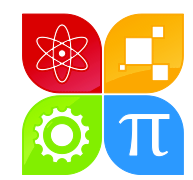
**STEM CONFERENCE • STEM TRADE SHOW • TEACHER EXPO
RESEARCH POSTER SESSION • STEM LEADERSHIP ACADEMY**



October 30-31, 2019

Steven Barbato
ITEEA Executive Director/CEO
Email: sbarbato@iteea.org

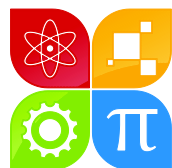
STEM4: The Power of Collaboration for Change!

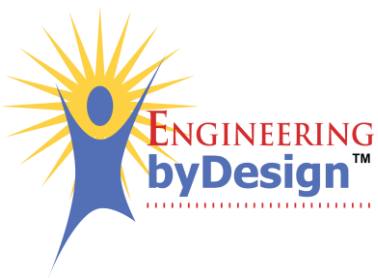




ITEEA Defined! Engaged Participation and Leadership!

• **Integrative STEM Education through the
Content and Practices of Technology
and Engineering Education**





WHO/WHAT IS ITEEA?

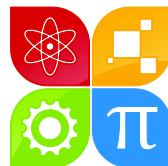
The professional organization for technology, innovation, design, and engineering educators.

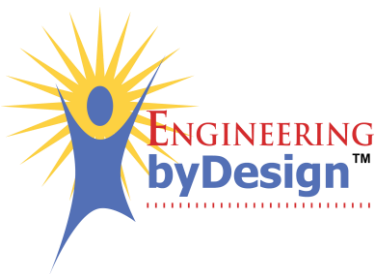


Resource:

[Who is ITEEA? Click Here!](https://www.iteea.org/File.aspx?id=90060&v=4416f187)

<https://www.iteea.org/File.aspx?id=90060&v=4416f187>





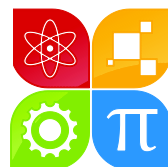
ITEEA: Who We Are

**Technological and Engineering Literacy for ALL students
STEM Center for Teaching and Learning
Standards-based EbD™ Curriculum for Grades PreK-12**

**Global professional development and membership services
STEMinars
STEM Journals for Prek_12 (TET – ESJ)
Leadership and Professional Growth
Annual Conference – Baltimore, March 11-14**

**Awards and Credentials
STEM School of Excellence, Program Excellence,
Program Excellence, Teacher Excellence, Emerging Leaders,
DTE, + + +**

International ITEEA STEM Centers



How do you define and deliver Technology and engineering education and STEM to your students?

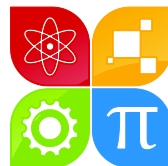
- STL Revision Update
- NGSS
- Common Core State Standards
- National Academy of Engineering initiatives on building capacity for K-12 Engineering Education
- NAE Grand Challenges
- Maker Spaces/Maker Education
- Technology Student Association

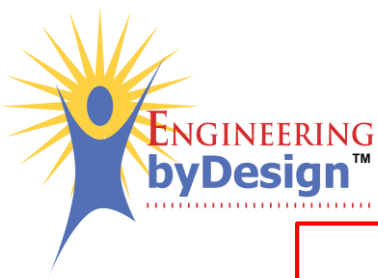




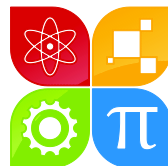
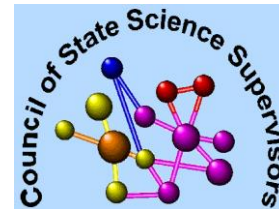
STEM⁴: The power of collaboration for change

A joint document authored by Advance CTE,
Association of State Supervisors of Mathematics,
Council of State Science Supervisors, and
International Technology and Engineering Educators Association



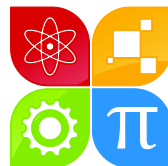


STEM Education Policy Collaborative



The Major Issues

- » Lack of STEM preparedness
- » Many STEM careers have not yet been envisioned
- » Lack of Equity



Setting The Stage

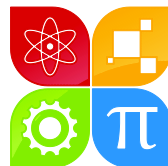
Top 10 Skills in 2015 were:

- | | |
|-----------------------------|---------------------------------|
| 1. Complex problem solving | 6. Quality control |
| 2. Coordinating with others | 7. Service orientation |
| 3. People management | 8. Judgment and decision-making |
| 4. Critical thinking | 9. Active listening |
| 5. Negotiation | 10. Creativity |

Top 10 Skills in 2020 will be:

- | | |
|-----------------------------|---------------------------------|
| 1. Complex problem solving | 6. Emotional intelligence |
| 2. Critical thinking | 7. Judgment and decision-making |
| 3. Creativity | 8. Service orientation |
| 4. People management | 9. Negotiation |
| 5. Coordinating with others | 10. Cognitive flexibility |

Source: *Future of Jobs Report*. World Economic Forum



Acknowledging the need for change is not enough!

Recent surveys of predominantly minority schools have indicated that:

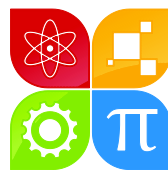
- High schools with a majority African-American or Latino enrollment are less likely to offer math and science classes, especially at advanced levels.
- Only 38% offered calculus, compared to 50% of all high schools.
- Just 51%, offered physics, compared to 60% of high schools overall.
- Children living in poverty, on average, are four years behind in academic performance than children living at high income levels.



Three Main Principles

Principle 1.

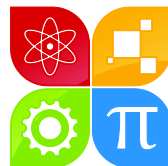
STEM education should advance the learning of each individual STEM discipline.



Three Main Principles

Principle 2.

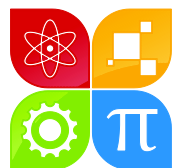
STEM education should provide logical and authentic connections between and across the individual STEM disciplines.



Three Main Principles

Principle 3.

STEM education should serve as a bridge to STEM careers.

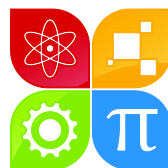


Why does this matter?

» Student engagement

» Relevance

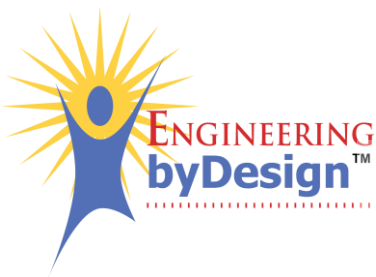
» Funding opportunities



Recommended Actions

- » Ensure high-quality STEM learning
- » Increase access and equity for students
- » Provide professional learning opportunities for teachers.





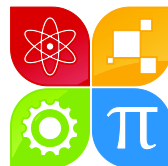
Recommended Actions



Principle 1. STEM education should advance the learning of each individual STEM discipline.

Ensure policies, practices, and resource allocations provide access and equity for all students to a high-quality STEM education

- Hold policymakers, schools, and educators accountable for equitable preparation of students.
- Provide all students a full range of math and science courses and offer high-quality science, mathematics, technology and engineering education programs ,
- Ensure high-quality professional learning for teachers focused on STEM content, practices and pedagogy.
- Provide access to industry experts for teachers to better understand the STEM workplace.
- Use innovative approaches to attract experienced STEM teachers to serve high-needs schools.
- Leverage federal, state, and local funding to promote and support STEM pathways



Principle 2. STEM education should provide logical and authentic connections between and across the individual STEM disciplines.

- Begin Early!
- Engage families and Community
- Implement Effective Instructional Strategies and Pathways
- Ensure an integrative STEM education approach in designing and delivering STEM activities, lessons, and units.
- Offer courses in technology and engineering design
- Engage students with meaningful, STEM-focused, in-school and out-of-school experiential learning opportunities (e.g., TSA, STEMinars, competitions, etc.)



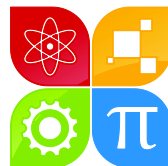


Recommended Actions



Principle 3. STEM education should serve as a bridge to STEM careers.

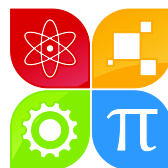
- Require career and college counseling
- Make technology available on an equitable basis for use in improving student learning and enhancing teacher professional development
- Provide materials that inform families
- Create school cultures where families are welcomed to participate in their student's STEM education
- Provide ongoing career resources connected to STEM
- Apply successful models to challenge the belief that underserved and underrepresented students cannot learn STEM and/or pursue STEM career pathways
- Partner with STEM businesses



STEM⁴: Final Thoughts

This paper is the product of an organized and coordinated effort among the leadership of our respective organizations to address the challenges faced when implementing STEM education and providing access to the knowledge, skills, and career pathways necessary for all students, particularly those in underserved populations.

It is our fervent hope that this paper, the product of our integrated efforts, will help to catalyze the necessary changes required to fuel better outcomes for our students, our society, and ultimately, ourselves.





PRINT

NAEP Technology & Engineering Literacy (TEL) Report Card

- Home
- Results
- Tasks
- Student Questionnaires
- Student Group Comparisons Tool
- About



Explore results for the 2018 NAEP Technology and Engineering Literacy Assessment

In 2018, the National Assessment of Educational Progress (NAEP) administered a nationally representative assessment of technology and engineering literacy (TEL) at eighth grade. TEL was a fully digitally based assessment that asked students to solve real-world technology and engineering problems. Students used laptops to answer questions that assessed their knowledge and skills in understanding technological principles, solving technology and engineering-related problems, and using technology to communicate and collaborate. Students also answered survey questions asking about their opportunities to learn about and engage in technology and engineering in and outside of school.

https://youtu.be/eziz0f_d2ZM





Technology and Engineering bring STEM to Life!

International Technology and Engineering Educators Association

www.iteea.org

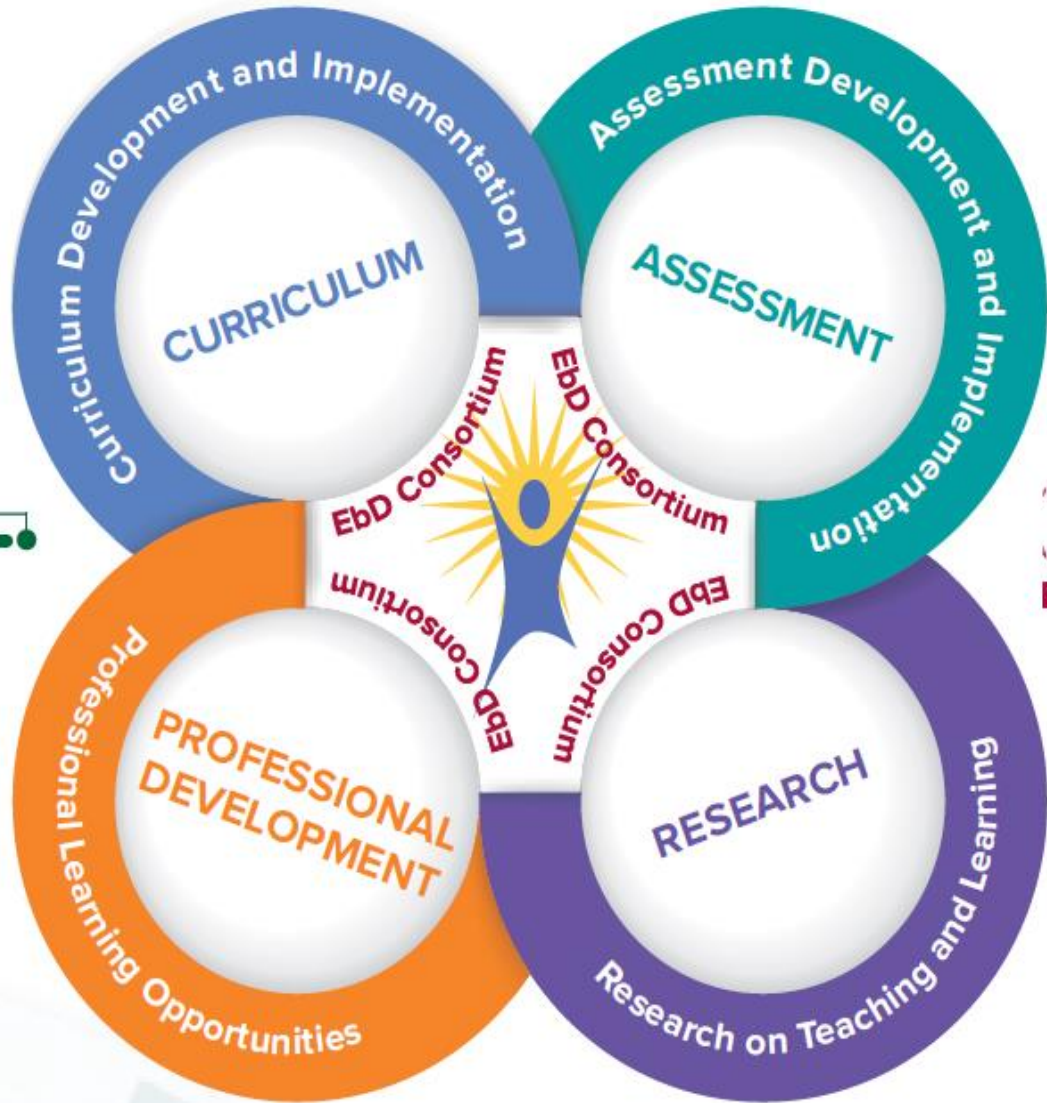


TECHNOLOGY
and ENGINEERING

Bring STEM to LIFE!



iteea.org



Integrative STEM Education is operationally defined as:
"the application of technological/engineering **design based** pedagogical approaches to **intentionally teach content and practices of science and mathematics education through the content and practices of technology/engineering education**. Integrative STEM Education is equally applicable at the natural intersections of learning within the continuum of content areas, educational environments, and academic levels" (Wells & Ernst, 2012/2015)

(as adapted from Wells/Sanders program documents 2006-10).



Revision of the Standards for Technological Literacy

- A Joint Project by ITEEA and CTETE
- Funded by the National Science Foundation ATE Conference Grant



How Do You Define and Operationalize Technology and Engineering Literacy?

Technology is the modification of the natural environment, through human designed objects, systems, and processes, to satisfy needs and wants.

Engineering is the use of scientific principles and mathematical reasoning to optimize technologies in order to meet needs that have been defined by criteria under given constraints.

Technological and engineering literacy is the ability to understand, use, create, and assess the human designed environment in increasingly and sophisticated ways over time. -- Current Draft Version of STEL, 2020



What “STEM” Looks Like

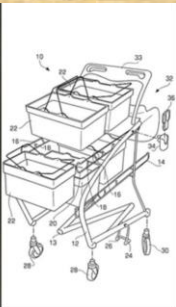
- Ted Talk Video of Jane Chen’s Project!
 - “A Warm Embrace That Saves Lives!”



Bringing STEM to Life through an Impactful Adaptive/Assistive Technology Challenge

Overview Toolkits FAQ

<https://www.iteea.org/Activities/2142/Reach.aspx?source=generalSearch>



IDEO and Shark Tank

STEM Education Policy and Advocacy:

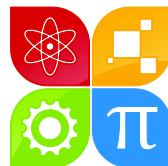
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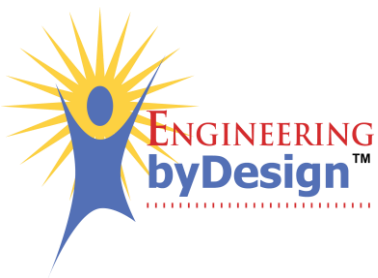
<https://www.iteea.org/File.aspx?id=137271&v=cb3f06a2&source=generalSearch>

Collaboratively Developed

- **Key leaders within These Organizations*:**
- Advance CTE; State Directors and state leaders of Career Technical Education
- Association of State Supervisors of Mathematics (ASSM);
- Council of Chief State School Officers (CCSSO);
- Council of State Science Supervisors (CS3); and
- ITEEA - The International Technology and Engineering Educators Association

*These organizations would like to thank **Texas Instruments** for their generous support in the creation of this document.





Leadership In Professional Organizations

- Be an active participant
- Leadership in Professional Organizations Like ITEEA begins with YOU! It is all about YOU!
- You... Serving The Profession by Supporting Others in Our Field!

ITEEA + YOU+ = Δ > Professional Future!



Join us!

ITEEA

BALTIMORE

MARCH 11-14, 2020

Thank You!



FUTURE CONFERENCE DATES

Denver – March 24-27, 2021 • Orlando – March 9-12, 2022

Minneapolis – April 12-15, 2023

www.iteea.org



June 28-July 2, 2019
June 29-July 1, 2020

MAY 2019

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APRIL 2020

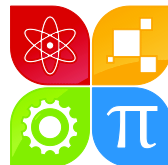
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Questions, Reflections, and Next Action Steps?



Today's Presentation:
191030_PA_STEMathon_TEEAP_ITEEA_STEM4

Steven Barbato, DTE
Executive Director, ITEEA
sbarbato@iteea.org





We look forward to seeing you and ALL your colleagues at ITEEA's 82nd Annual Conference!

The graphic for the conference features the word 'BALTIMORE' in large, outlined letters. The letter 'A' contains a calculator icon, 'L' contains a pencil icon, 'I' contains a satellite icon, and 'O' contains a robot icon. Above the word is the 'ITEEA' logo. Below the word is the date 'MARCH 11-14, 2020' in blue and orange text, followed by the full name of the association: 'INTERNATIONAL TECHNOLOGY AND ENGINEERING EDUCATORS ASSOCIATION'.

**Students Who Study
Technology and
Engineering**

“Bring STEM to Life!”

