

MiSTEM Advisory Council

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MiSTEM Advisory Council

- Created in 2015 in MCL 388.1699s
 - 11 voting members appointed by the Governor
 - 4 non-voting legislative appointees
- Currently made up of leaders from K-12, higher education, business, and philanthropy
- Three specific functions:
 1. “...recommend a statewide strategy for delivering STEM education-related opportunities to pupils”
 2. Recommend “objective criteria for determining preferred STEM programs”
 3. “work with directors of mathematics and science centers to connect educators with businesses, workforce developers, economic developers, community colleges, and universities”
- Report published on March 1

What We Found

- Michigan already has all the necessary components to be successful:
 - Dedicated teachers, talent demand, interested philanthropy, existing regional infrastructure
- However, these components are disconnected and directionless, leading to “random acts of STEM”

A Statewide Vision for STEM

- Michigan can again be the world leader in innovation, talent, and technology.
 - There are high school students working on autonomous vehicle technology today.
- The Council created four pillars for STEM education in Michigan:
 1. Create a new STEM culture
 2. Empower STEM teachers
 3. Integrate businesses and educators
 4. Ensure high-quality STEM experiences

1. Create a new STEM culture

- STEM is a mindset that can be applied to any content area.
 - Intellectual fearlessness and curiosity
 - Failure as enrichment
 - Novel problem solving
- It is engaging students in hands-on, relevant experiences.



1. Create a new STEM culture

- STEM not only cultivates expertise but also teamwork, critical thinking, and novel problem solving. This combination is what employers need.



Square One Innovative Vehicle Design

1. Create a new STEM culture

- Today's STEM jobs are very different from the dirty factories of the past.



Chrysler 200 Factory in Sterling Heights

1. Create a new STEM culture

- And it's not just manufacturing...

The screenshot shows the University of Michigan Health System website. The header includes the 'M' logo, 'HEALTH SYSTEM UNIVERSITY OF MICHIGAN', and a search bar. Navigation links include 'UofM Health Blogs', 'About Us', 'Maps & Directions', 'News', 'Quality & Safety', and 'Contact Us'. A secondary navigation bar has 'Find a Physician', 'Conditions & Treatments', 'Locations', 'Patient & Visitor Guide', and 'Make a Gift'. The breadcrumb trail reads: Home > Conditions & Treatments > Surgery > Surgical Services > Robotic Surgery.

University of Michigan Surgery

Surgery

- Why Choose Michigan
- Becoming a Patient
- Make an Appointment
- Surgical Services
- Robotic Surgery**

Robotic Gynecologic Surgery

Robotic Pancreas, Liver and GI Surgery

Robotic Thoracic Surgery

Robotic Urologic Surgery

Transoral Robotic Surgery (TORS)

Pediatric Surgery

Robotic Surgery

At the University of Michigan, we strive to use exciting, new technology that improves our patients' outcomes and maintains their quality of life. Robotic surgery is one option that our surgeons excel in and continue to be at the forefront.

In 2001, The University of Michigan was among the first centers in the U.S. to utilize robotic technology for gynecological surgery. Currently we are one of a few surgery programs in the country with a dedicated robotic simulation center to train residents and physicians, plus develop new techniques for robotic surgery.

Conditions we treat and procedures we perform that may be appropriate for robotic surgery include:

- **Achalasia** (swallowing disorder)
- **Acid reflux**
- **Biliary tract disease**
- **Bladder cancer**
- **Colorectal disease**

Locations

HEALTH SYSTEM MAPS & DIRECTIONS

PATIENT EDUCATION FROM HEALTH SYSTEM EXPERTS

LEARN MORE >

Was this helpful?

Yes

No

1. Create a new STEM Culture

- Parents, students, and educators need to be aware of the incredible career opportunities that STEM can provide in Michigan *today*:
 - Almost 100,000 open jobs in mitalent.org
 - Over 5,000 STEM jobs in the last month

2. Empower STEM Teachers

- The adoption of the Michigan Science Standards represents a new era of STEM teaching in Michigan.
- The new standards get away from “knowing” science and into *doing* science.

2. Empower STEM Teachers

- Application, critical thinking, and real world practices:
 - Gone are the days of science worksheets

3. Circle the valence electrons only. How many valence electrons does each atom have?

F Cl Br I

- New Michigan Science Standard:

HS-PS1-1 Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

2. Empower STEM Teachers

- Like the STEM mindset, the standards focus on a set of skills that can be taken to any content area.
 - These are referred to as “crosscutting concepts”
- However, the standards are so different from past practices that teachers need support to learn how to integrate them.

2. Empower STEM Teachers

- According to the National Academy of Science,

“... available evidence suggests that many science teachers have not had sufficiently rich experiences with the content relevant to the science courses they currently teach, let alone a substantially redesigned science curriculum.”

2. Empower STEM Teachers

- Teachers *want* to teach this way, but they're not sure how to best do it.
- Michigan already has the necessary pieces to support teachers, we just need to integrate them.

3. Integrate Employers and Educators

- It's time to create a formal mechanism to connect businesses and educators.
- This can be done using existing regional frameworks.

3. Integrate Employers and Educators

- This not only exposes students to hands-on, relevant experiences (Creating an new STEM Culture), it also exposes teachers to real-world methods they can bring back to the classroom (Empowering STEM Teachers).
- This helps answer the oft-asked student question “how will I ever use this in my life?” and creates an intrinsic motivation for students to engage in their education.

4. Ensure High-Quality STEM Experiences

- Due to the lack of state direction, there are several unanswered questions when it comes to quality.
- The Council is committed to having a robust discussion this year regarding quality.

4. Ensure High-Quality STEM Experiences

- However, we believe that all high-quality STEM experiences:
 1. are hands-on, problem-based, authentic, engaging, and experiential,
 2. increase proficiency in the Michigan Science Standards,
 3. go beyond content knowledge and teach life skills like communication, teamwork, leadership, critical thinking, and gracious professionalism,
 4. utilize industry partners,
 5. create value for educators, students, and businesses, and
 6. provide an atmosphere for students to express themselves and have fun applying STEM skills and interests to creatively solve personally relevant problems.

4. Ensure High-Quality STEM Experiences

- The Council has begun a discussion on metrics. In the short term, we've identified four statewide metrics:
 - Grades 4 math and science proficiency
 - Grade 8 math and science proficiency
 - STEM education degree attainment
 - Apprenticeship completion

Recommendations

- Regarding the Math Science Center Network:
 1. Rebrand the Michigan Math Science Centers as Michigan STEM Centers.
 2. Require all STEM Centers to facilitate the creation of a regional plan.
 3. Empower STEM Centers to facilitate STEM events to raise STEM awareness.
 4. Allow STEM Centers to connect educators and employers to support a culture of intern/externships and apprenticeships for both teachers and students.
 5. Empower STEM Centers to bring together regional employers and educators to create guided pathways for regional STEM careers.
 6. Allow STEM Centers to create a one-stop-shop website to support teachers through PD opportunities, grant applications, regional business connections, etc.

Recommendations

- Regarding state-funded activities under Section 99s:
 - Any activity must:
 1. be project-based,
 2. demonstrably enhance proficiency in the Michigan Science Standards,
 3. be aligned to the strategic plan developed by the regional STEM Center,
 4. have a business partner who agrees that the program will result in students acquiring skills that the employer needs,
 5. collect and report data to the state that can be used to examine outcomes.
 - Further, activities will ideally:
 1. be accessible to every student during normal school hours at no cost to the student,
 2. contain a teamwork component that is applicable to in-class activities,
 3. be able to be started in middle school or, more ideally, in elementary school,
 4. be paired with a regional higher education and/or business supported professional development component that supports the integration of the Michigan Science Standards ,
 5. promote soft skills,
 6. leverage state funds by demonstrating strong partnership with local businesses or philanthropy through donations of funds or other in-kind support.

Recommendations

- Regarding any CTE Equipment funding:
 - Must
 1. be hands-on and delivered through comprehensive programs and curriculum designs,
 2. be aligned to the strategic plan developed by the regional STEM Center,
 3. have a business partner who agrees that the program will result in students acquiring skills that the employer needs,
 4. be able to lead to (but not necessarily result in) an industry-recognized credential,
 5. demonstrate a strong partnership between educators and employers through business donations of labor, teacher professional development, equipment maintenance and upkeep, or the equipment itself.
 - Ideally
 1. integrate with a curriculum that increases proficiency with the relevant Michigan Science Standards,
 2. result in an industry-recognized credential.

Recommendations

- Regarding other state policies
 1. STEM Diploma Endorsement: The Council strongly supports the concept of recognizing students who have engaged in high- 11 quality STEM activities. We commit to partnering with the legislature to discuss, create, and implement a meaningful credential for students.
 2. SR 146: the regional framework recommended in this document may provide a possible avenue.
 3. Encourage educators to engage in STEM-related work experiences. Eg: allow for teacher “externships” with regional businesses to count for continuing education credits, professional development hours, or other relevant professional credentials.
 4. Support educators with high-quality professional development to implement the new Michigan Science Standards.
 5. Create a model whereby properly vetted and qualified STEM practitioners can participate in teaching, particularly in CTE fields. Eg: a “teaching internship” or “teaching residency” model.
 6. Begin recording student participation in registered apprenticeships.
 7. Provide educators with opportunities for practicing and receiving feedback using teaching that engages students with technology and computational thinking to address meaningful real life problems.
 8. Develop and implement meaningful assessment tools and practices that document STEM learning for college or career readiness.

Questions

- Voting members:
 - Co-Chair: Kathleen Bushnell Owsley, Executive Director, Bosch Community Fund
 - Co-Chair: Christian Velasquez, Marketing Director, Dow Corning Corporation
 - R. Charles Dershimer, Ph.D., Clinical Assistant Professor, School of Education, University of Michigan
 - Harrison Ford, Student, Kettering University
 - Lee Graham, Training Coordinator, Operating Engineers
 - Jim Heath, President, Stryker Instruments (Retired)
 - Kenneth Kelzer, Vice President Global Vehicle Components and Subsystems, General Motors
 - Jay Kulbertis, Ed.D., Superintendent, Gladstone Area Schools
 - Josh Nichols, STEM Teacher, Stockbridge Community Schools
 - Satish Udpa, Ph.D., Executive Vice President, Michigan State University
 - Carolyn Wierda, Executive Director of STEM@SVSU, Saginaw Valley State University
- Legislative Appointees:
 - Representative Leslie Love, 10th District (Detroit, Redford)
 - Representative Jim Tedder, 43rd District (Waterford Township, Lake Angelus, Clarkston, Independence Township)
 - Senator Hoon-Yung Hopgood, 6th District (Belleville, Romulus, Taylor, Westland)
 - Senator John Proos, 21st District (Berrien, Cass, and St. Joseph Counties)