Continental Breakfast

Wi-Fi: SHEC2015
Password: Disrupt1
Welcome

Dr. Talmesha Richards
Chief Academic & Diversity Officer
STEMconnector® and Million Women Mentors
The Occasion

Robert J. Denson
Des Moines Area Community College President and STEM Higher Education Council (SHEC) Chair
Distinguishing Characteristics

➢ Leads a high-energy and national “boundary-breaking STEM collaboration” of industry, government and education with an action-oriented agenda.

➢ Promotes high-impact strategies that improve outcomes in STEM education at all levels. Focuses on the unique role of Higher Education connecting students to the workforce and STEM careers.

➢ Collaborates with business to calibrate supply with workforce demand.

➢ Emphasizes providing workplace-learning experiences to inform student preparation and career choices.

➢ Showcases model partnerships between higher education and industry that achieve measurable results and scale.

➢ Incorporates a diverse array of institutions including Community Colleges, Public and Land Grant Universities, Private Colleges and Universities and Minority Serving Institutions – and, Business.
From: STEM 1.0

STEM is the Intersection of Supply and Demand

To: STEM2.0

Where Supply and Demand “Intersect” .................”Align”.

#SHECSummit
Achievements

• **April 1, 2014:** The STEM Higher Education Council (SHEC) was created

• **June 11, 2014:** Town Hall with Dr. Martha Kanter, Arizona State University, Apollo Group, Austin Community College, Oak Ridge Associated Universities; United Negro College Fund; Olin College of Engineering, Taft College, Chattanooga State Community College, and My College Options.

• **October 7–8, 2014:** Advancing a Jobs-Driven Economy National Leaders Summit Representatives of SHEC member institutions and their best business partners met in WDC and showcased their high impact STEM-SkillForce initiatives.

• **December 3, 2014:** Town Hall: “Driving Meaningful Change in Higher Education”

• **February 18-20, 2015:** Higher Education Council meeting and Book Release: “Advancing a Jobs-Driven Economy”.

• **March 25, 2015:** STEM Council Meeting — Session Nine in Washington, DC.

• **May 15, 2015:** NRCCUA/ My College Options STEM Summit- “Shaping America’s Future Workforce” in Washington, DC at the Willard Hotel.

• **July 22, 2015:** STEM Council Meeting-Session Ten in Washington, DC

• **September 21, 2015:** Million Women’s Mentors Summit & Gala in Washinton, DC at tha National Press Club Ballroom

#SHECSummit
<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
<th>Contact Information</th>
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<tbody>
<tr>
<td>November 9</td>
<td>STEM Higher Education Council: Disruptive Innovation in Higher Education Summit</td>
<td>Chair: Rob Denson (DMACC) <a href="mailto:Talmesha.Richards@STEMconnector.org">Talmesha.Richards@STEMconnector.org</a> <a href="mailto:Ted.Wells@STEMconnector.org">Ted.Wells@STEMconnector.org</a> <a href="mailto:Edie.Fraser@STEMconnector.org">Edie.Fraser@STEMconnector.org</a></td>
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<td></td>
<td>In Washington, DC at the National Press Club Ballroom</td>
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<td>Feature of SHEC Special Report: Scaling STEM Success – Nurturing and Retaining STEM Talent</td>
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<td>November 10</td>
<td>STEM Councils Meeting – Session Eleven</td>
<td><a href="mailto:Tim.Edwards@STEMconnector.org">Tim.Edwards@STEMconnector.org</a></td>
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<td></td>
<td>In Washington, DC</td>
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<td>November 23</td>
<td>Fourth 2015 STEM Higher Education Council Leadership Call</td>
<td>Chair: Rob Denson (DMACC) <a href="mailto:Talmesha.Richards@STEMconnector.org">Talmesha.Richards@STEMconnector.org</a> <a href="mailto:Ted.Wells@STEMconnector.org">Ted.Wells@STEMconnector.org</a> <a href="mailto:Edie.Fraser@STEMconnector.org">Edie.Fraser@STEMconnector.org</a></td>
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<td>December 8</td>
<td>Cyber Security – Town Hall Google Hangout</td>
<td><a href="mailto:Lorena.Fimbres@STEMconnector.org">Lorena.Fimbres@STEMconnector.org</a> <a href="mailto:Edie.Fraser@STEMconnector.org">Edie.Fraser@STEMconnector.org</a></td>
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<tr>
<td>January</td>
<td>Release of Scaling STEM Success – Nurturing and Retaining STEM Talent</td>
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<td>February</td>
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<td>April 1</td>
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<td>April 28</td>
<td>STEM Global Talent Summit At Gallup in Washington, DC</td>
<td><a href="mailto:Edie.Fraser@STEMconnector.org">Edie.Fraser@STEMconnector.org</a> <a href="mailto:Heidi.Kleinbach-Sauter@pepsico.com">Heidi.Kleinbach-Sauter@pepsico.com</a> <a href="mailto:Tim.Edwards@STEMconnector.org">Tim.Edwards@STEMconnector.org</a></td>
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<td>Release of 100 CEO Leaders in STEM &amp; Panel Discussion at STEM Global Talent Summit</td>
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<td>September</td>
<td>“100 Leaders in STEM” Google+ Hangouts On Air Town Hall</td>
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SHEC Members as of November 2015

[List of logos representing various institutions]
**Advancing a Jobs-Driven Economy:**
Higher Education and Business Partnerships Lead The Way

This publication was a call to action for higher education and industry to work together and prepare students to become successful STEM professionals in tomorrow’s economy. The book summarizes successful industry collaborations. The content of the book, which focuses on boundary-breaking collaborations between industry and education, include:

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<td>Connecting Teachers and Students to STEM Opportunities</td>
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<td>Nurturing Innovation</td>
<td>Career Focused Experiential Learning</td>
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<td>Partnerships that Drive Success</td>
<td>Lifelong Learning and Competency Based Education</td>
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<td>Industry Models</td>
<td>The Diversity Opportunity</td>
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<td>An Inside Look at the Information Technology Sector</td>
<td>Developing STEM Human Capital through State and Federal Action</td>
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<tr>
<td>Building the Workforce of Tomorrow Through Manufacturing</td>
<td>A Global Perspective</td>
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<tr>
<td>K-12 STEM Education: Laying the Foundation</td>
<td>Conclusion and Call for Action</td>
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#SHECSummit
Scaling STEM Success: 
Nurturing and Retaining STEM Talent

- This publication will highlight projects initiated by SHEC members towards retaining STEM talent in the nation’s educational system.
- Some of these initiatives include:
  - Equipping students for the STEM workforce
  - Impacting on job creation in the STEM industry.
  - Sharing of boundary breaking industry partnerships.
  - Sharing of SHEC best practices and its effectiveness.
Boosting America’s Innovation

Dr. Martha Kanter
Former Under-Secretary of Education and Distinguished Visiting Professor of Higher Education, New York University
Creating Opportunities through Integrating Sectors

Dr. Peter Stokes
Managing Director, Huron Consulting Group
Author of Higher Education and Employability:
New Models for Integrating Study and Work

Introduced by Andrew Wheeler, Practice Leader, Education and Not-for-Profit Practice, Diversified Search

#SHECSummit
Higher Education and Employability:
Creating Opportunities through Integrating Sectors
Peter J. Stokes, Ph.D.

Disruptive Innovation in Higher Education
STEMconnector’s Higher Ed Council
November 9, 2015
1 Why is employability a challenge for higher education?
2 How should institutions and employers respond?
3 What role can partnerships play in fostering marketable skills?
Why is employability a challenge for higher education?
Underemployment and the Skills Gap Are Driving Change

Yet it’s unclear who in the ecosystem is responsible for addressing employability.

Parents

Want their children to choose the right schools and the most rewarding majors.

Students

Want to provide rigorous academic instruction and relevant co-curricular experiences that enrich and prepare students for the workplace.

Universities

Want academic programs, career guidance, and experiential learning opportunities that develop marketable skills.

Start-ups

Want to connect students, mentors, and professionals, and provide other value-added services.

Employers

Want talent that is ready to work in diverse teams and effectively problem solve from day one.

Alignment is needed to support a more effective employability ecosystem.
Current Approaches to the Challenge Are Often Inefficient

No single actor in the ecosystem can address the challenge sufficiently on its own.

- Many institutions push students into the job market and hope for the best, as though shooting them out of a cannon with a parachute and hoping for a soft landing.

- Employers are becoming frustrated with the talent pipeline and are attempting to pull talent from the pool themselves by collaborating with alternative providers.

- Service providers are creating networks to connect students, mentors, and recruiters while also delivering professional development services of their own.

This diversity of approaches results in a lack of system-wide coordination.
Our Understanding of Educational Outcomes Is Changing

AS IS OUR UNDERSTANDING OF INSTITUTIONS’ ROLES IN SUPPORTING THOSE OUTCOMES

“Ten years ago, this whole conversation wasn’t happening. Nobody cared what happened when you left school. You just paid your bill and you left.”
– Senior SUNY Administrator
With New Outcomes Expectations Comes a New Mission

AND MEETING THE MISSION MAY REQUIRE NEW APPROACHES TO EDUCATING

“We needed more skill in the work force. We turned to colleges and said, ‘You have a new mission.’ Higher education really is a work-force-development system. It doesn’t like to see itself that way.”

Anthony P. Carnevale
*Chronicle*, September 2014

“We would recommend higher education administrators focus on improving academic rigor and increasing the academic standards at their institutions...[as well as] programs that facilitate school-to-work transitions, in terms of internships, apprenticeships, job placement programs.”

Richard Arum and Josipa Roksa
*Wall Street Journal*, September 2014

“Access to a college education is no longer enough. The world has changed so significantly that colleges and universities must complement traditional education with real experience, including authentic connections to the workplace.”

John Fry, President, Drexel University
*Chronicle*, January 2014

“A degree, once considered the passport to a graduate-level career, needs to now come in a total package – ‘graduate plus’ – as employers seek well-rounded employees who are ‘work-ready’ with clear evidence of both job-specific skills and prized graduate attributes.”

Wendy Purcell, President, Plymouth University
*Inside Higher Ed*, June 2014
How should institutions and employers respond?
For Many the Key Outcome Measure Today Is Career Success

NOW INSTITUTIONS MUST COMPETE ON THEIR ABILITY TO NURTURE MARKETABLE SKILLS

- **Curriculum:** Integrate study and work
- **Instruction:** Foster work readiness among graduates
- **Results:** Develop a talent pipeline for the region
But Few Are Certain About What Work Readiness Looks Like

SOME POINT TO COGNITIVE AND NON-COGNITIVE SKILLS, OTHERS POINT TO QUALITIES OR VALUES

Passion
Mindfulness
Inquisitiveness
Curiosity
Self-awareness
Resilience
Technical Skills

Collaboration
Assertiveness
Empathy
Communication
Motivation
Optimism

Grit

It is critical to focus on developing abilities that can be tested in authentic professional contexts so students can reflect on, and apply, their learning.
Fostering Work Readiness Is a Shared Responsibility

INTEGRATING STUDY AND WORK REQUIRES ECOSYSTEM-WIDE COLLABORATION AND ALIGNMENT

- Selecting a field of study
- Building a portfolio of work

- Designing curriculum
- Providing career services

- Supporting internships
- Defining job needs

- Creating incentives
- Providing funding

- Delivering bridge programs
- Linking professional networks
But Not All Agree on What Sharing Responsibility Means
OR WHO SHOULD DRIVE THE COLLABORATION

The U.S. Chamber of Commerce is promoting a “demand-driven system.”

U.S. Chamber of Commerce, Managing the Talent Pipeline, November 2014
What role can partnerships play in fostering marketable skills?
**Collaboration May Be the Most Successful Strategy**

OPPORTUNITIES FOR INSTITUTION-EMPLOYER COLLABORATION LIE ACROSS THE VALUE CHAIN

* Target audiences suited to **high demand professions**
* Promote a **value proposition** around work readiness
* Assist students in **selecting programs** that prepare them for employment opportunities

* **Conduct primary research** with employers to assess areas of greatest need
* Draw on labor market data and **social listening** to determine which programs to launch
* Evaluate **curricular and faculty resources** for their fit with current market requirements for talent
* Host **industry colloquia** to surface significant pain points and opportunities
* Host **curriculum design summits** involving employers and faculty
* **Bring industry leaders** to the classroom or student group to inform **career-pathing decisions**
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* **Define an assessment rubric** that functions in both academic and workplace settings
* **Collaborate with employers** to **assess and track graduates’ readiness and success**
* **Provide experiential learning opportunities** – **internships, co-ops, and apprenticeships**
* **Develop a strategic business solutions unit** matching talent to market needs
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Collaboration May Be the Most Successful Strategy

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* Target audiences suited to high demand professions
* Promote a value proposition around work readiness
* Assist students in selecting programs that prepare them for employment opportunities
* Draw on labor market data and social listening to determine which programs to launch
* Evaluate curricular and faculty resources for their fit with current market requirements for talent
* Draw on graduate career success data to identify program success factors
* Conduct primary research with employers to assess areas of greatest need
* Host industry colloquia to surface significant pain points and opportunities
* Host curriculum design summits involving employers and faculty
* Define an assessment rubric that functions in both academic and workplace settings
* Connect the classroom to the world of work through problem-based learning or competency-based education models
* Collaborate with employers to assess and track graduates’ readiness and success
* Host design challenge events to engage student teams in tackling real world problems
* Provide bridge programs to augment traditional curricula
* Identify opportunities to outsource certain college-to-work transition capabilities such as internships, networking, and more
* Demonstrate the payoff to employers for collaborating closely with your institution
* Treat career services as a strategic business solutions unit matching talent to market needs
* Assist employers in recruiting more effectively on campus
* Treat alumni relationships not just for philanthropy but to inform the design of curriculum
* Identify alums who can serve as mentors to current students or recent grads
* Identify alums who recruit talent into their organizations and strike partnerships with them for internships
* Explore alumni relationships to support corporate relationship management
* Create multiple benefits for corporate and other employer partners, including networking
* Nurture alumni relationships for their fit with current market requirements for talent
Collaboration May Be the Most Successful Strategy

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* Target audiences suited to **high demand professions**
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* Draw on **labor market data** and **social listening** to determine which programs to launch
* Evaluate **curricular and faculty resources** for their fit with current market requirements for talent
* Draw on **graduate career success data** to identify program success factors
* Conduct **primary research** with employers to assess areas of greatest need
* Host industry **conferences** to surface significant pain points and opportunities
* Host **curriculum design summits** involving employers and faculty
* Bring industry leaders to the classroom or student group to inform **career-pathing decisions**
* Connect the classroom to the world of work through **problem-based learning** or **competency-based education models**
* Provide **bridge programs** to augment traditional curricula
* Define an **assessment rubric** that functions in both academic and workplace settings
* Host **design challenge events** to engage student teams in tackling real world problems
* Collaborate with employers to assess and **track graduates’ readiness and success**
* Identify **high-impact program components** that students and employers believe generate the best return
* Treat career services as a **strategic business solutions unit** matching talent to market needs
* Evaluate curricular and faculty resources for their fit with current market requirements for talent
* Identify **alumni** who can serve as **mentors** to current students or recent grads
* Identify alums who recruit talent into their organizations and strike partnerships with them for **internships**
* Explore alumni relationships to support **corporate relationship management**
* Create multiple benefits for corporate and other employer partners, including **networking**
* Demonstrate the payoff to employers for **collaborating** closely with your institution

Marketing & Enrollment | Program planning | Curriculum design | Delivery models | Experiential learning | Assessment models | Career services | Alumni relations | Corporate relations
---|---|---|---|---|---|---|---|---

Teaching and Learning: Promote **experiential learning opportunities**—**internships**, **co-ops**, and **apprenticeships**

**Host design challenge events** to engage student teams in tackling real world problems

**Provide bridge programs** to augment traditional curricula

**Define an assessment rubric** that functions in both academic and workplace settings

**Collaborate with employers** to assess and **track graduates’ readiness and success**

**Treat career services** as a strategic business solutions unit matching talent to market needs

Collaboration May Be the Most Successful Strategy

**Design of curriculum**

**Marketing & Enrollment**

**Promote a value proposition** around work readiness

**Assist students in selecting programs** that prepare them for employment opportunities

**Target audiences** suited to **high demand professions**

**Nurture alumni relationships** not just for philanthropy but to inform the **design of curriculum**

**Explore alumni relationships** to support **corporate relationship management**

**Create multiple benefits** for corporate and other employer partners, including **networking**

**Demonstrate the payoff to employers** for **collaborating** closely with your institution
### Meanwhile Venture Capital Is Fueling Innovation

**COMPANIES MAY THREATEN TO SUPPLANT OR OFFER TO SUPPORT TRADITIONAL EDUCATORS**

<table>
<thead>
<tr>
<th>Marketing &amp; Enrollment</th>
<th>Program planning</th>
<th>Curriculum design</th>
<th>Delivery models</th>
<th>Experiential learning</th>
<th>Assessment models</th>
<th>Career services</th>
<th>Alumni relations</th>
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<td>Diverse public relations and consulting firms</td>
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## Sample Collaborations to Foster Marketable Skills

DIVERSE INSTITUTIONS EXCEL AT FORGING THESE SORTS OF COLLABORATIONS

<table>
<thead>
<tr>
<th><strong>Northeastern University &amp; Burning Glass</strong></th>
<th><strong>SNHU &amp; Flatiron</strong></th>
<th><strong>MIT &amp; Alumni</strong></th>
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</thead>
<tbody>
<tr>
<td>• Real-time labor market data</td>
<td>• Flatiron will collaborate with SNHU Online to deliver an online coding bootcamp offering nationally</td>
<td>• Undergraduate Practice Opportunities Program (UPOP) “career success accelerator”</td>
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<tr>
<td>• Informs program identification and design decisions</td>
<td>• Students can enroll in a 3+1 program that includes a six month apprenticeship</td>
<td>• Half of sophomores apply to full-year program that features coaching from MIT alums, field trips, networking events and more</td>
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<tr>
<td>• Informs marketing of a program portfolio within the context of a region or industry</td>
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Employability efforts such as these are closely linked to the unique mission of each institution as well as to areas of competitive advantage.
Collaboration Best Harnesses the Power of the Ecosystem
AND FOSTERS A MORE EFFICIENT TALENT DEVELOPMENT PIPELINE

• Collaborate in defining work-readiness
• Identify the contributions of the key stakeholders in the ecosystem and work to align goals and resources
• Rather than a supply-driven or demand-driven talent development pipeline, articulate a genuinely coordinated and cooperative one
• Bring work into the classroom and education into the workplace by integrating curriculum and experiential learning in diverse venues
• Look for opportunities to involve alternative providers that can add real value for all stakeholders

Thoughtful collaboration between sectors can enhance the contributions of all stakeholders in promoting the development of marketable skills.
Thank you.

Peter J. Stokes, Ph.D.
Managing Director
Huron Consulting Group
125 Summer Street
Boston, MA 02110
617-226-5507
pstokes@huronconsultinggroup.com
www.huronconsultinggroup.com
Aligning College Majors To In-Demand Jobs

- **Delta College**- Dr. Reva Curry, Vice President, Instruction and Learning Services
- **Gateway Technical College**- Greg Herker, Fab Lab Program Coordinator
- **Ivy Tech Community College**- Tom Snyder, President
- **Madison Area Technical College**- Dr. Thomas Tubon, Project Director and Principal Investigator, NSF ATE Program
- **National Coalition of Certification Centers**- Roger Tadajewski, Executive Director
- **University of Wisconsin, Stout**- Dr. Sylvia Tiala, Associate Professor

Moderated by Dr. V. Celeste Carter, Lead Program Director for Advanced Technological Education (ATE), National Science Foundation (NSF)
Innovation Within Innovation

- Middle School Student Readiness Pipeline
- STEM Employer Demand Center
Middle School Readiness Pipeline begins with Proficiency in Mathematics
Creating a STEM Employer Demand Center
Fab Lab @ Gateway Technical College

Greg Herker – Fab Lab Program Coordinator
herkerg@gtc.edu
Fab Lab Tools
New Product Design
“Rocket Stove”
Certifications

The Link to Global Competitiveness

Disruptive Innovation in Higher Education
Credential Growth

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<tr>
<th>Year</th>
<th>Certificates</th>
<th>Technical Certificates</th>
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<td>2,234</td>
<td>5,100</td>
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<td>5,377</td>
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<td>2,027</td>
<td>5,740</td>
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<td>6,625</td>
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<td>2010-11</td>
<td>1,264</td>
<td>7,969</td>
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<td>2011-12</td>
<td>3,257</td>
<td>8,939</td>
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<td>2012-13</td>
<td>3,090</td>
<td>9,265</td>
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<td>2013-14</td>
<td>3,217</td>
<td>9,453</td>
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Growth: 824% 192%

Source: Graduate Profile and Trend Report
RE-ENGINEERING OF THE COLLEGE

NEW ACADEMIC DIVISIONS

University and Transfer

Business and Public Services

Health Services

Technology

Program Examples:
- Liberal Arts
- Pre-Engineering
- Fine Arts
- Education
- Dental Assisting
- Health Information Technology
- Nursing
- Respiratory Care
- Surgical Technology

Program Examples:
- Business Administration
- Criminal Justice
- Early Childhood Education
- Homeland Security/Public Safety
- Hospitality Administration (Culinary)
- Advanced Automation and Robotics Technology
- Automotive Technology
- Electronics and Computer Technology
- HVAC
- Informatics
Math Requirements by Program

UNIVERSITY & TRANSFER DIVISION

Math 123- Quantitative Reasoning
- Criminal Justice
- Early Childhood Education
- Education (or MATH 135)
- Fine Arts
- General Education Transfer Core (or MATH 135 /136)
- General Studies
- Homeland Security /Public Safety
- Human Services
- Liberal Arts AA
- Library Technical Assistant
- Paralegal Studies
- Professional Communication
- Visual Communications++

Math 135-Finite Math
- Accounting
- Liberal Arts AS

Math 136- College Algebra
- Agriculture AS
- Biotechnology++
- Building Construction Management++
- Cyber Security/Information Assurance
- Database Management & Administration ++
- Electrical Engineering Technology
- Engineering Technology++
- Hospitality Administration++
- Informatics AS
- Mechanical Engineering Technology++
- Nanotechnology++
- Software Development AS++
- Supply Chain Management/Logistics

Math 201- Brief Calculus
- Business Administration AS

Math 211- Calculus
- Computer Science
- Pre-Engineering

+denotes selective admission/limited enrollment program
++denotes enrollment limited by lab facilities/equipment
Math Requirements by Program

**HEALTH DIVISION**

**No Math Required**
- Dental Assisting+
- Practical Nursing+

**Math 123-Quantitative Reasoning**
- Dental Hygiene+
- Health Care Support++
- Health Information Technology+
- Medical Assisting++
- Medical Laboratory Technology+
- Neurodiagnostic Technology+
- Nursing+
- Paramedic Science+
- Respiratory Care+
- Surgical Technology+
- Therapeutic Massage++

**Math 135-Finite Math**
- Kinesiology++

**Math 136-College Algebra**
- Imaging Sciences+
- Physical Therapist Assistant+
- Radiation Therapy+

+denotes selective admission/limited enrollment program
++denotes enrollment limited by lab facilities/equipment
Math Requirements by Program

BUSINESS & PUBLIC SERVICES DIVISION

Math 123
- Accounting
- Business Administration
- Criminal Justice
- Early Childhood Education
- Environmental Design++
- Homeland Security/Public Safety
- Hospitality Administration++
- Human Services
- Mortuary Science+
- Office Administration++
- Paralegal Studies
- Visual Communications++

+denotes selective admission/limited enrollment program
++denotes enrollment limited by lab facilities/equipment
Math Requirements by Program

**TECHNOLOGY & APPLIED SCIENCES DIVISION**

**Math 122-Technical Mathematics**
- Automotive Technology++
- Aviation Technology++
- Building Construction Management++
- Construction Technology++
- Design Technology++
- Energy Technology++
- HVAC++
- Industrial Apprenticeship+
- Industrial Technology++
- Energy Technology++
- Machine Tool Technology++
- Manufacturing Production and Operations
- Advanced Automation and Robotics

**Math 123-Quantitative Reasoning**
- Agriculture AAS
- Database Management/Admin ++
- Informatics
- Information Technology Support ++
- Network Infrastructure++
- Server Administration ++
- Software Development ++

**Math 136-College Algebra**
- Biotechnology++
- Chemical Technology++
- Cyber Security/Information Assurance ++

**Math 137-Trigonometry**
- Electronics and Computer Technology++

+denotes selective admission/limited enrollment program
++denotes enrollment limited by lab facilities/equipment
Top Degrees Awarded – 2014-15 Academic Year

Associate Degrees

Nursing
Health Care Support
Medical Assisting
Accounting
Computer Information Technology
Hospitality Administration
Industrial Technology
Education
Office Administration
Computer Information Systems
Top Degrees Awarded – 2014-15 Academic Year

Technical Certificates (TC)

Health Care Support
Medical Assisting
Practical Nursing
Industrial Technology
Accounting
Computer Information Technology
Automotive Technology
Apprentice Tech Electrician
Top Degrees Awarded – 2014-15 Academic Year

Career Certificates (CT)

Medical Office Administration
Bookkeeper
Fundamental Payroll
Outpatient Insurance Coding
Engine Performance
Heating Ventilation Air Conditioning
Structural Welding
PC Support and Administration
Pharmacy Technician
Power Train
Electrocardiography Technician
## Roadmap to the Goal

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<tr>
<th>Roadmap to the Goal</th>
<th>Total</th>
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<tbody>
<tr>
<td>High school graduation and college participation rates</td>
<td>3,631,000</td>
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<td>Public college completion rates</td>
<td>5,315,000</td>
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<tr>
<td>Adults, first time in college</td>
<td>1,531,000</td>
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<tr>
<td>Degree completion by returning adults</td>
<td>3,621,000</td>
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<td>High-value certificates</td>
<td>10,310,000</td>
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<tr>
<td><strong>Total additional degrees and certificates produced by 2025</strong></td>
<td><strong>24,408,000</strong></td>
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Madison College

• Founded in 1912, part of the 16 members of the Wisconsin Technical College System.

• Over 140 career paths serving more than 40,000 students, including many of the fastest growing occupations identified by the WDWD.

• 9 Campuses (5 in Madison, 4 Regional).

• 12 counties, 40 school districts, 224 municipalities, and 744,676 residents.

• Greater than 90% placement rate within 6 months following graduation.
In Demand Jobs: BIOTECHNOLOGY

WISCONSIN: A MAGNET FOR BIOSCIENCE ACTIVITY

MORE THAN 1,600 WISCONSIN BIOSCIENCE COMPANIES ARE ACTIVELY MOVING THE STATE’S ECONOMY FORWARD. THE INDUSTRY IS THRIVING BECAUSE OF ITS ABILITY TO ATTRACT TALENT AND CREATE REGIONAL HUBS OF BIOSCIENCE ACTIVITY.
Responding to an Emerging Need: Creation of a Technical Program in Stem Cell Science

12 students: 100% Biotechnology

47 graduates: 39 - Stem Cell Industry 5 - Biotechnology (other)

2007-2010

2011

2012

2013

2014

2015-2018

NSF ATE 0501520 / WICELL
Pilot Program
NSF ATE
Industry Partnerships
WiCell

NSF ATE DUE 1104210 $851,454
Full Program Development
40 member advisory board
Academic-Industry Partnerships

NSF ATE DUE 1501553 $660,980

DUE 0501520
DUE 1104210
DUE 1501553

12 students: 100% Biotechnology

47 graduates: 39 - Stem Cell Industry 5 - Biotechnology (other)
Retaining Talent in the STEM Ecosystem

- **Austin Community College**- Dr. Richard M. Rhodes, President and CEO
- **University of Colorado, Colorado Springs**- Dr. Tom Christensen, Physics Professor and Co-Director, UCCSTeach Program
- **University of Iowa**- Dr. Leslie Flynn, Professor of Science Education and Founder of Stem Innovator
- **Western Governors University**- Dr. Maria Andersen, Director of Learning Design and STEM Product Manager, Teachers College
- **University of Massachusetts, Boston**- Dr. Andrew Grosovsky, Dean, College of Science and Mathematics

Moderated by Brandon Busteed, Executive Director, Education and Workforce Development, Gallup
Break
America Needs Talent

Jamie Merisotis
President and CEO, Lumina Foundation
Author of America Needs Talent:
Attracting, Educating, and Deploying the 21st-Century Workforce

Introduced by Martin Scaglione, President and CEO, Hope Street Group
Attracting, Educating & Deploying the 21st-Century Workforce

America Needs Talent

@JamieMerisotis    #AmericaNeedsTalent
AMERICA’S FUTURE DEPENDS ON ITS TALENT.
Talent is what happens when knowledge, skills and abilities are honed by education and experience in a way that benefits both individuals and society at large.
Two-thirds of all jobs being created require a post-high school education.
The Five Ways:

1. Reinvigorate the **private sector**
2. Redefine the **federal role**
3. Reimagine **immigration**
4. Revitalize **cities as talent hubs**
5. Redesign **higher education**
REDESIGN HIGHER ED
Equity and excellence
Expanding the SCOPE of Experiential Learning: Student TED Talk

Jamie Gorson
Olin College of Engineering, Senior

Nicole Rifkin
Olin College of Engineering, Senior

#SHECSummit
Industry and Experiential Education

- **Accumold** - Roger Hargens, President and CEO
- **Olin College of Engineering** - Michelle Davis, Chief Marketing Officer
- **Rose-Hulman Institute of Technology** - Dr. Elizabeth Hagerman, Vice President, Rose-Hulman Ventures
- **Taft College** - Mark Williams, Vice President of Instruction
- **University of California, Davis** - Dr. Mark Henderson, Associate Dean of Admissions, School of Medicine

Moderated by Al Bunshaft, CEO, DS Government Solutions
Olin College of Engineering

Born to disrupt
Olin College of Engineering – *Designed to be different.....*

“...an important and constant contributor to the advancement of engineering education..”

- No academic department; no tenured
- Gender balance
- Experiential learning from day one – hands on, teamwork, self-directed, choice, people-inspired
- Culminates in SCOPE, paid sponsorship of teams by companies
It’s Working

- Highest U.S. 6-year graduation rate at 95%
- Highest percent of women graduates in country
- Average starting salary of > than $75,000
- More employer demand than students
- Many start-ups
- 40% graduate school (25% to MIT, Stanford and Harvard)
- Highest producer of Fulbright Scholars
- More than 1,500 educators visiting
Background

- Access to primary care (PC) improves health
- There is a PC physician shortage—yet fewer than 25% of medical school grads choose PC
- Women, minorities more likely to practice PC
- The path to medicine is long and prohibitively expensive in lower SES groups (debt >$200K)
- New PC doctors often unprepared eg to manage chronic illness (Kaiser study)
Accelerated Competency-based Education in Primary Care (ACE-PC)

- Partnership with Kaiser Permanente
- To produce more and better PC doctors faster
- Traditional (4 yrs): 2 (basic science) + 2 (clinical)
- ACE (3 yrs): clinical boot camp (6 wks) before basic sciences with hands-on PC experience throughout in an integrated system (Kaiser)
- Preferential admission to local PC residencies
- Scholarships to reduce debt ($30K per year)
Admissions: First Who...then What

- *Holistic* admissions...beyond GPA and MCAT
- Past behavior e.g. leadership, service orientation, work experience, and grit
- Multiple mini-interviews: communication, teamwork, feedback, emotional intelligence
- Secondary interviews with residency program
- ACE students: older (maturity, experience), minority, lower SES, community service focus
How is it disruptive?

- Professors, particularly basic scientists, do not want to cede control of curriculum.
- PC physicians feel their degree cheapened ("if someone can do in 3 years what took me 4….”)
- Traditional (4-yr) students wonder why they can’t have it too eg shorter, more hands-on, greater integration.
- ACE students becoming agents of change.
Broadening STEM Participation of Diverse Populations

- **Farm Bureau Financial Services** – Dan Greteman, Chief Information Officer and Chair, IT Industry Partnership
- **Florida International University** - Eric Brewe, Assistant Professor of Science Education, Department of Teaching and Learning, College of Education and Associate Director for Research, STEM Transformation Institute
- **Michigan Technological University** - Dr. John Lehman, Associate Vice President for Enrollment, Marketing, and Communication

Moderated by Ted Wells, Chief Strategy Officer, STEMconnector®
Broadening STEM Participation of Diverse Populations

Given the emphasis on return on investment from funders, how do you measure and define success in your efforts to broaden participation in STEM fields?
Broadening STEM Participation of Diverse Populations

How has high level leadership impacted your efforts to broaden participation in STEM fields?
Broadening STEM Participation of Diverse Populations

While top-level leadership is critical, working at a grassroots level is often even more challenging and as important. Can you describe your outreach efforts to diverse students and/or parents to get them interested and excited about STEM careers and fields of study?
Broadening STEM Participation of Diverse Populations

So much of disruption in higher education today focuses on connecting employers to students in scalable and sustainable ways? Can you discuss how you are doing this? How are you measuring your success?
Equity in Education: A Fireside Chat

George Miller
Former U.S. Representative and Senior Education Advisor
Cengage Learning

With Robert J. Denson
President, Des Moines Area Community College
STEM Higher Education Council, Chair

Introduced by Daniel Jenkins, US Agency Lead, Regulatory Affairs, Monsanto
College Disrupted

Ryan Craig
Managing Director, University Ventures
Author of *College Disrupted: The Great Unbundling of Higher Education*

Introduced by Dr. Talmesha Richards, Chief Academic & Diversity Officer, STEMconnector® and Million Women Mentors

#SHECSummit
College Disrupted

The Great Unbundling of Higher Education

November 2015
Part I

Closing the Skills Gap
Strengths And Weaknesses Of U.S. System

Biggest strength:
Highest rate of matriculation; diversity of students

Biggest weakness:
Isomorphism (the four “Rs”)
Crises of Data, Affordability and Governance

- First for-profits; enrollment down by half over last 5 years
- Small private and midsize state universities: 70% effectively failed to meet budget for both freshman enrollment and net tuition revenue in 2014-15

Gallup-Purdue survey: only half of 30k college alumni strongly agreed that higher education investment was a good one.
- Only 38% of younger alumni.
- Employers also dissatisfied: Ernst & Young UK, Google.
- "Higher education has to get past the ‘take our word for it’ era. Increasingly, people aren’t.” – Mitch Daniels, President of Purdue University
Market View

• Elite universities will be fine
• For the rest, starting to see “Great Hollowing Out”
  • Retail: Sears, JC Penney, Gap, J. Crew
  • Restaurants: Olive Garden, Red Lobster, TGIF

• Connected to decline of middle class
• Likely question: “Discounter” or “Premium Provider”?
• Certain question: How to differentiate?
Q. What is at top of higher education “stack”? 

A. Jobs 

Full-stack companies need to:
• Develop and deliver specific high-quality educational experiences that produce graduates with capabilities that specific employers desperately want
• Work with students to solve for the financing of the educational experiences
• Connect students with employers during and following the educational experience and make sure they get the job

They may not look like traditional universities
“Full-Stack”: “Just-In-Time” Education

“Top-Up” Programs

Alternative Models

[Logos for GA, General Assembly, galvanize, yearup, Kaplan, Dev Bootcamp, Koru, The Fullbridge Program, and PerScholas]
The Modern Urban Campus

Working and Learning Becoming Synonymous

Education Focused Entirely on Outcomes

Master of Engineering in Big Data
A New Class of Data Scientists
Just-In-Time Model for...

Healthcare

Energy

Biotech

Financial services
Yawning Gap Between College and Employment

Casualties of gap:

- Dissatisfied students
  - Only 12% of graduating seniors with job offers before graduation

- Dissatisfied employers
  - Only 11% think graduating students have competencies their businesses need
Filling In The Gap: Pre-Hire Training
Combining Training + Placement

College

Pre-Hire Training

Employment

Skills-based education/training

Proactive matching/placement

Employer-specific training
## Intermediary Business Models

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Training sv.</strong></td>
<td>Bootcamps</td>
<td>Screening/ interview training</td>
<td>Skills training curricula</td>
</tr>
<tr>
<td></td>
<td>Online skills courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Training + matching/ placement sv.</strong></td>
<td>Bootcamps w/ placement</td>
<td>Staffing 2.0</td>
<td>Outsourced career services</td>
</tr>
<tr>
<td></td>
<td>Online training with employer engagement</td>
<td>Employment broker</td>
<td></td>
</tr>
<tr>
<td><strong>Matching/ placement products &amp; sv.</strong></td>
<td>Career assessment (offline and online)</td>
<td>Competency marketplaces ePortfolios</td>
<td>Credential mgmt. Curriculum mgmt.</td>
</tr>
</tbody>
</table>
# Proliferation of Companies in Each Category

## Revenue model

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Training svvs.</td>
<td>FULLBRIDGE</td>
<td>LearnUp</td>
<td>OPLERNO</td>
</tr>
<tr>
<td>Training + matching/placement svvs.</td>
<td>Galvanize</td>
<td>eIntern</td>
<td>experience</td>
</tr>
<tr>
<td>Matching/placement products &amp; svvs.</td>
<td>Kuder</td>
<td>LinkedIn</td>
<td>parchment</td>
</tr>
</tbody>
</table>
What Role Can Colleges Play?

<table>
<thead>
<tr>
<th>Skills-based education/training</th>
<th>✓</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proactive matching/placement</td>
<td>✗</td>
</tr>
<tr>
<td>Employer-specific training</td>
<td>✗</td>
</tr>
</tbody>
</table>
Part II

The Great Unbundling
The Great Unbundling
Degrees: Default Currency of Labor Market
Unbundling 101

- Music
  - Album/CD bundle to iTunes
- Television
  - Cable bundle to Netflix and HBO Now
  - Now Verizon and other cable providers starting to offer choice
- Unbundling shifts producer surplus to the consumer
- Bachelor’s program is also a bundle
- Does every element provide adequate benefit to every student?
  - Gen. ed. courses
  - Courses in major
  - Distribution requirements
  - Library
  - Extracurriculars
  - Athletics, lazy rivers, research?
- What might prompt “The Great Unbundling”?
Finer Currency Increases Market Efficiency
A Better Term for “Competencies”

FOR ONLINE TO REALLY MATTER IN EDUCATION, WE NEED TO REDEFINE COMPETENCY

In the early ’90s, I could tell what someone thought about the Internet’s prospects for transforming higher education by listening to their vocabulary. If they used terms like “distance learning” or “distance education,” they’d probably been working in continuing education for some time and saw the Internet as simply the latest in a line of technologies — beginning with correspondence courses, and including the latest two-way video systems — to expand the reach of colleges and universities. The Internet wasn’t going to disrupt the field. So why should it define it?

In contrast, those of us who rejected “distance learning” in favor of “online learning” understood that
Competency Marketplaces
Double-Click Degrees
What SaaS Has Done to Enterprise Software...

SaaS MODEL:

ADOBE CREATIVE SUITE BECOMES ADOBE CREATIVE CLOUD

- Build product from Day 1 with focus on customer experience and value
  - Unbundle into component parts
- Decide on your business model
  - There may be many
- “Customer for life” mindset
  - Major opportunity
Will Degrees Go Way Of Debutantes?

- Unclear ROI
- Too exclusive
New Business Models

More revenue from employers/placement and less reliance on Title IV

<table>
<thead>
<tr>
<th>Guaranteed outcome</th>
<th>Cost to job-seeker</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Paid</td>
<td>Free</td>
</tr>
<tr>
<td>Yes</td>
<td>Medical assistant</td>
<td>Sonographer</td>
</tr>
<tr>
<td></td>
<td>Nurse</td>
<td>Radiologic technologist</td>
</tr>
</tbody>
</table>

More revenue from employers/placement and less reliance on Title IV
New Competition

~100 RPOs with over $100M in revenue (vs. ~ 20 for-profit universities)
We May Find...

More value in owning competency profile than in delivering postsecondary education

Major question: If competency marketplace attributes competency to you, who owns that competency?
STEM Talks: Scaling STEM Success

- **STEMconnector® and Million Women Mentors** - Edie Fraser, Chief Executive Officer
- **Monster Government Solutions** - Bruce Stephen, Director of Real-Time Labor Intelligence and Market Research
- **Apollo Education Group** - Jane Oates, Vice President for External Affairs
- **Higher Education Research and Development Institute (HERDI) South** - Dr. Jim Catanzaro, Director
- **Gateway Technical College** - Dr. Bryan Albrecht, President
- **Lakeview Technology Academy** - William Hittman, Principal/Director
- **Lakeview Technology Academy** - Matt Schultz, Technology and Engineering Instructor
Scaling STEM Success: Nurturing and Retaining STEM Talent
Scaling
STEM
Success
Web Portal
Univrsity of Phoenix® College of Security and Criminal Justice and ASIS International launched the Enterprise Security Competency Model. Designed to represent the competencies that are essential for being prepared for a career in today's ever-changing security industry, the model is the first of its kind...
University of Phoenix® College of Security and Criminal Justice and ASIS International launched the Enterprise Security Competency Model. Designed to represent the competencies that are essential for being prepared for a career in today’s ever-changing security industry, the model is the first of its kind. Careers in Enterprise Security fulfill critical roles in the protection of national and global economies, and the industry is changing.

Yet despite its size and scope, until now the security industry has not yet widely endorsed a clear set of competencies and skills to enable the workforce to keep pace with expanding roles and responsibilities.

To develop a security workforce well equipped to meet a multitude of risks and challenges, the industry must better define itself by promoting its variety of dynamic career paths and required competencies. Today’s security careers span every industry, offer opportunities for specialization, and can open up paths to executive leadership roles. Security leaders need education and training that is distinct from that of law enforcement, and comprehensive enough to meet the growing need to safeguard a complex global economy.

To respond to workforce development challenges, the ASIS Foundation, partnered with University of Phoenix® College of Security and Criminal Justice, engaged in multiple research initiatives to identify the specific professional competencies and skills that are required to respond to the security risks that enterprises are most likely to face over the next five years. The goal of these research efforts was to establish consensus on which security competencies are needed across industries to close the skills gap by defining clearer career pathways for tomorrow’s professionals.

Those key tenets include:

• Expand education and training programs to match industry challenges.
• Ensure that curriculum and competency standards apply to a variety of job descriptions.
• Include experiential learning and critical thinking components that allow learners to practice skills under a variety of conditions, and apply their learning to solve complex problems.
Increasingly, business and STEM courses are emerging as essential requirements for security professionals; thus, interdisciplinary and integrated education programs can prepare the security workforce with a more expansive skill set. “The dynamic between a rapidly changing environment and a lack of industry-accepted competencies contributes to the skills gap and the related misalignment of educational programs available to support the industry,” said Spider Marks, executive dean, College of Security and Criminal Justice, University of Phoenix. “Through this Enterprise Security Competency Model, University of Phoenix is able to provide the educational degrees, training and certificate programs to prepare security professionals and employers for these challenging and rewarding roles.” The Enterprise Security Competency Model details the core set of skills and knowledge that industry practitioners are expected to have.

The Enterprise Security Industry Competency Model
Written by University of Phoenix in collaboration with the ASIS Foundation, the leading security organization this model has been adopted by the U.S. Department of Labor. The base tiers of the pyramid represent a broad foundation of personal abilities; the middle tiers show educational, technical and functional proficiencies; and the top tiers reflect competencies by occupation. Employers use this model to assess skills when recruiting job candidates or evaluating employee performance. Additionally, the model serves as a resource to inform discussions among industry leaders, educators, economic developers and public workforce investment professionals.

Find the interactive Enterprise Competency Model [here](#).
Scaling STEM Success

Monster

Scaling STEM Success
Demand for STEM Professionals is on the Rise in the U.S.

- The demand for STEM professionals in the U.S. market has maintained double-digit gains from September 2014 through August 2015; recent activity is showing signs of easing with an 8% gain over the year in September 2015

Source: Wanted Technologies and Monster Insights, 10/14/15
Most in demand STEM occupations, certificates, and skills in the U.S.

<table>
<thead>
<tr>
<th>Occupations</th>
<th>Certificates</th>
<th>Hard Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Software Developers, Applications</td>
<td>• Top Secret Sensitive Compartmented Information</td>
<td>• Java</td>
</tr>
<tr>
<td>• Computer Systems Analysts</td>
<td>• Project Management Professional</td>
<td>• Structured query language</td>
</tr>
<tr>
<td>• Computer User Support Specialists</td>
<td>• Certified Information Systems Security Professional</td>
<td>• Linux</td>
</tr>
<tr>
<td>• Network and Computer Systems Administrators</td>
<td>• Professional Engineer</td>
<td>• Quality Assurance</td>
</tr>
<tr>
<td>• Information Technology Project Managers</td>
<td>• Cisco Certified Network Associate</td>
<td>• JavaScript</td>
</tr>
<tr>
<td>• Industrial Engineers</td>
<td>• Occupational Safety &amp; Health Administration Certification</td>
<td>• Technical support</td>
</tr>
<tr>
<td>• Web Developers</td>
<td>• Microsoft Certified Systems Engineer</td>
<td>• Systems Development Life Cycle</td>
</tr>
<tr>
<td>• Computer Systems Engineers/Architects</td>
<td>• Project Management Institute</td>
<td>• UNIX</td>
</tr>
<tr>
<td>• Computer and Information Systems Managers</td>
<td>• Certified Information Systems Auditor</td>
<td>• Microsoft SQL Server</td>
</tr>
<tr>
<td>• Information Security Analysts</td>
<td>• Cisco Certified Network Professional</td>
<td>• Python</td>
</tr>
<tr>
<td>• Software Quality Assurance Engineers and Testers</td>
<td>• Oracle Database 11g Administrator Certified Professional</td>
<td>• Web services</td>
</tr>
<tr>
<td>• Mechanical Engineers</td>
<td>• Certified Information Security Manager</td>
<td>• Hypertext markup language</td>
</tr>
<tr>
<td>• Computer Programmers</td>
<td></td>
<td>• Relational Database Management System</td>
</tr>
<tr>
<td>• Electrical Engineers</td>
<td></td>
<td>• Extensible markup language</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• C-sharp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Microsoft .NET Framework</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Adobe LifeCycle ES</td>
</tr>
</tbody>
</table>

Source: Wanted Technologies and Monster Insights, 10/14/15
IT Engagement Remains an Ongoing Recruitment Challenge

- All IT jobs across the nation average a Hiring Difficulty of 74
- Among the highest IT jobs in demand, the most difficult positions to fill include Web Developers (92), Systems Engineers and Architects (89), Software Quality Assurance Engineers and Testers (89) and IT Project Managers (89)

Hiring Difficulty is a score 1 through 99, where 1 is the easiest job to fill and 99 is the hardest job to fill; the score is compiled based on jobs, resumes, salaries, average posting period, job board source and unemployment rates

Source: Wanted Technologies and Monster Insights, 10/14/15
Engineering Engagement Varies Widely Across Occupations Most In Demand

- All Engineering/QA jobs across the nation average a Hiring Difficulty of 51
- Among the highest Engineering jobs in demand, the most difficult positions to fill include Industrial Engineers (80) and Industrial Safety/Health Engineers (78)

Source: Wanted Technologies and Monster Insights, 10/14/15
Overview:
We provide the median pay for 20 of the top-paying jobs for recent graduates in the STEM Disciplines.

Only U.S. workers with 3 years or less of experience who have earned a Bachelors degree and no higher degree are considered. In addition, the overall median pay for all U.S. workers with 3 years or less of experience who have earned a Bachelors degree and no higher degree is provided, as well as the median pay for all U.S. Workers with 3 years or less of experience who have earned a Bachelors degree in a STEM field and no higher degree.

Definitions:
Total Cash Compensation (TCC): TCC combines base annual salary or hourly wage, bonuses, profit sharing, tips, commissions, and other forms of cash earnings as applicable. It does not include equity (stock) compensation, cash value of retirement benefits, or the value of other non-cash benefits (e.g. healthcare).

Median Pay: The median pay is the national median (50th Percentile) annual total cash compensation. Half of the people doing the job earn more than the median, while half earn less.

Range in pay within a job can be very wide depending upon years of experience, scope of responsibility, location of work, etc. For example, pay can be higher than the stated median pay if the worker has more responsibility, chooses a higher paying field, or works in a city like New York.

Years of Experience: These are the number of years the respondent has spent in their field/career. Therefore the years of experience will incorporate all applicable jobs in the field, not just the current job.

Only workers with 3 years or less years of experience are included. In addition, only jobs in which at least 25% of employees have 3 years or less of experience are included in the list.

ONET Code: The code associated with the job title as defined by the Occupational Information Network (O*NET).

ONET Detailed Occupation: The occupation associated with the job title as defined by the Occupational Information Network (O*NET).

STEM: We used the following major CIP codes to define this Major Grouping:
## Top Paying STEM Jobs for Recent Grads

<table>
<thead>
<tr>
<th>Job Title</th>
<th>Median Pay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall STEM Majors</td>
<td>$54,900</td>
</tr>
<tr>
<td>Overall All Majors</td>
<td>$44,200</td>
</tr>
<tr>
<td>Reservoir Engineer</td>
<td>$101,000</td>
</tr>
<tr>
<td>Petroleum Engineer</td>
<td>$96,000</td>
</tr>
<tr>
<td>Facilities Engineer</td>
<td>$71,800</td>
</tr>
<tr>
<td>Network Security Analyst</td>
<td>$70,000</td>
</tr>
<tr>
<td>Reliability Engineer</td>
<td>$69,600</td>
</tr>
<tr>
<td>Automotive Engineer</td>
<td>$68,200</td>
</tr>
<tr>
<td>Chemical Engineer</td>
<td>$67,600</td>
</tr>
<tr>
<td>Hardware Design Engineer</td>
<td>$66,600</td>
</tr>
<tr>
<td>Nuclear Engineer</td>
<td>$66,300</td>
</tr>
<tr>
<td>Mobile Applications Developer</td>
<td>$65,100</td>
</tr>
<tr>
<td>Technical Sales Representative</td>
<td>$64,700</td>
</tr>
<tr>
<td>Metallurgist - Physical</td>
<td>$64,100</td>
</tr>
<tr>
<td>Software Developer</td>
<td>$63,900</td>
</tr>
<tr>
<td>Project Manager, Manufacturing</td>
<td>$63,900</td>
</tr>
<tr>
<td>Business Intelligence (BI)</td>
<td>$63,200</td>
</tr>
<tr>
<td>Field Sales Engineer</td>
<td>$62,600</td>
</tr>
<tr>
<td>Electrical Engineer</td>
<td>$62,600</td>
</tr>
<tr>
<td>Actuarial Analyst</td>
<td>$60,300</td>
</tr>
<tr>
<td>Business Intelligence (BI) Analyst</td>
<td>$58,800</td>
</tr>
<tr>
<td>Biomedical Engineer</td>
<td>$56,400</td>
</tr>
</tbody>
</table>

Overview
PayScale provides the early and mid-career median pay for the top 20 Associate's STEM majors and the top 20 Bachelor's STEM majors, ranked by mid-career median pay.

Definitions

Rank: The rank of the major based on the mid-career median pay.

STEM Major: Any major in the fields of science, technology, engineering, or mathematics.

Median Pay: The median pay is the national median (50th Percentile) annual total cash compensation. Half the people doing the job earn more than the median, while half earn less.

Total Cash Compensation (TCC): TCC combines base annual salary or hourly wage, bonuses, profit sharing, tips, commissions, and other forms of cash earnings, as applicable. It does not include equity (stock) compensation, cash value of retirement benefits, or value of other non-cash benefits (e.g., healthcare).

Years of Experience: These are the number of years the respondent has spent in their field/career. Therefore the years of experience will incorporate all applicable jobs in the field, not just the current job.
• Early Career: Respondents with 0 to 5 years of experience.
• Mid-Career: Respondents with 10 or more years of experience.

Early Career Median Pay: This is the median pay for workers with 0 to 5 years of experience.

Mid-Career Median Pay: This is the median pay for workers with 10 or more years of experience.

Degree Type: This is the degree level of the given major. Only respondents who earned the given major at the given degree level and hold no higher degree are included in this analysis.

About PayScale
Creator of the largest database of individual compensation profiles in the world containing more than 54 million salary profiles, PayScale, Inc. provides an immediate and precise snapshot of current market salaries to employees and employers through its online tools and software. PayScale’s products are powered by innovative algorithms that dynamically acquire, analyze and aggregate compensation information for millions of individuals in real-time. Publisher of the quarterly PayScale Index™, PayScale’s subscription software products for employers include PayScale MarketRate™, PayScale Insight™, and PayScale Insight Expert™. PayScale’s cloud compensation software is used by more than 3,000 customers including Bloomberg BNA, Cummins, Warby Parker, Clemson University and Signature HealthCARE. For more information, please visit: www.payscale.com or follow PayScale on Twitter: http://twitter.com/payscale.
## Top Paying STEM Majors with an Associate’s Degree

<table>
<thead>
<tr>
<th>Rank</th>
<th>Major</th>
<th>Early Career Pay</th>
<th>Mid-Career Pay</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (tie)</td>
<td>Electronics &amp; Communications Engineering</td>
<td>$45,100</td>
<td>$69,600</td>
</tr>
<tr>
<td>1 (tie)</td>
<td>Mechanical Engineering Technology (MET)</td>
<td>$40,600</td>
<td>$69,600</td>
</tr>
<tr>
<td>3</td>
<td>Occupational Health and Safety</td>
<td>$50,300</td>
<td>$68,200</td>
</tr>
<tr>
<td>4</td>
<td>Computer Science (CS)</td>
<td>$40,900</td>
<td>$67,400</td>
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<tr>
<td>5</td>
<td>Networks &amp; Telecommunications</td>
<td>$41,600</td>
<td>$66,400</td>
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<td>6</td>
<td>Computer Programming</td>
<td>$42,300</td>
<td>$65,300</td>
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<tr>
<td>7</td>
<td>Electrical Engineering Technology (EET)</td>
<td>$42,600</td>
<td>$65,100</td>
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<tr>
<td>8</td>
<td>Mechanical Design</td>
<td>$43,700</td>
<td>$64,900</td>
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<tr>
<td>9</td>
<td>Biomedical Equipment Technology</td>
<td>$40,800</td>
<td>$64,800</td>
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<tr>
<td>10</td>
<td>Mathematics</td>
<td>$40,200</td>
<td>$64,200</td>
</tr>
<tr>
<td>11 (tie)</td>
<td>Civil Engineering Technology (CET)</td>
<td>$37,300</td>
<td>$62,500</td>
</tr>
<tr>
<td>11 (tie)</td>
<td>Electronics Engineering</td>
<td>$43,200</td>
<td>$62,500</td>
</tr>
<tr>
<td>11 (tie)</td>
<td>Information Systems (IS)</td>
<td>$41,300</td>
<td>$62,500</td>
</tr>
<tr>
<td>14</td>
<td>Computer Information Systems (CIS)</td>
<td>$39,700</td>
<td>$61,400</td>
</tr>
<tr>
<td>15</td>
<td>Electronics &amp; Computer Technology</td>
<td>$39,100</td>
<td>$60,500</td>
</tr>
<tr>
<td>16</td>
<td>Chemistry</td>
<td>$31,500</td>
<td>$60,000</td>
</tr>
<tr>
<td>17</td>
<td>Electronics Engineering Technology (EET)</td>
<td>$41,500</td>
<td>$59,900</td>
</tr>
<tr>
<td>18</td>
<td>Computer &amp; Network Administration</td>
<td>$41,500</td>
<td>$59,100</td>
</tr>
<tr>
<td>19</td>
<td>Industrial Technology (IT)</td>
<td>$41,500</td>
<td>$59,000</td>
</tr>
<tr>
<td>20</td>
<td>Information Technology (IT)</td>
<td>$39,100</td>
<td>$58,600</td>
</tr>
</tbody>
</table>

Source: PayScale, Inc., October 2015
Research, the Forgotten STEM Careers

- Howard University - Dr. Sonya Smith, Professor and Chair, Department of Mechanical Engineering and Principal Investigator, HU ADVANCE-IT
- Oak Ridge Associated Universities - Dr. David Duncan, Senior Vice President and Program Director for Scientific Assessment and Workforce Development (SAWD)
- Tuskegee University - Dr. Walter Hill, Dean - College of Agriculture, Environment & Nutrition Sciences
- University of Phoenix - Dr. Hinrich Eylers, Executive Dean, School of Advanced Studies
- University of Nebraska, Lincoln - Dr. Ronnie Green, Vice Chancellor of the Institute of Agriculture and Natural Resources
- Arizona State University - Dr. Mahmud Farooque, Arizona State University Associate Director of the Consortium for Science, Policy and Outcomes DC office

Moderated by Dr. Keith Moo-Young, Chancellor, Washington State University-Tri Cities
Increasing Entrepreneurship by Women in STEM in the Academy

Sonya T. Smith, Ph.D.
Professor of Mechanical Engineering
Howard University
Principal Investigator, HU ADVANCE-IT
Women Participating in Entrepreneurship by FEI*

- US is ranked #1 for female entrepreneurship by FEI*

- Female entrepreneurs have higher levels of education

- Female entrepreneurs’ innovativeness and participation in the technology sector has decreased
  - suggests that the use and transfer of technology has increased
  - the number of businesses producing new technology has decreased

*Siri Terjesen and Ainsley Lloyd, “The 2015 Female Entrepreneurship Index (FEI) “
Women Participating in Entrepreneurship by FEI* (continued)

• US lowest scores were the following:
  – Opportunity recognition
  – Knowing an Entrepreneur
  – New Technology

*Siri Terjesen and Ainsley Lloyd, “The 2015 Female Entrepreneurship Index (FEI)”
Women as a percentage of full-time, full professors with science, engineering, and health doctorates, by institution of employment: 1993–2010


Sonya Smith, PhD
Underrepresented minorities as a percentage of full-time, full professors with science, engineering, and health doctorates, by institution of employment: 1993–2010

Low participation fields for women: Computer sciences and engineering, 1991–2010


Sonya Smith, PhD
HU ADVANCE-IT Objectives

• **Education.** To foster and sustain a climate and culture which seeks inclusion of all faculty regardless of race, gender, or other target characteristics at the University and in the department.

• **Advocacy.** To advance the careers of women faculty in STEM disciplines at Howard University.

• **Empowerment.** To position Howard University as a national repository of scholarship on women of color STEM faculty professional experiences, accomplishments, and leadership.
WOMEN CURRENTLY IN THE ACADEMY
Faculty Handbook

- Last revision 1993
- Faculty Handbook Revision Committee (FHRC)
  - Charged to update the 1993 handbook
- Revised handbook submitted March 2013
- Section 6.2.3.3 *Tenure Clock Extensions*
  - Child birth or adoption
  - Serious health condition
  - Death of a parent, child, spouse, or domestic partner
  - Catastrophic property loss
Mini Grants

• Research literature documents women faculty have less access to discretionary resources
• 20 awards to date
• 90% increase in applications from Cycle 1
Research Symposium

- March 2013 Women in STEM Research Symposium
- April 2014 – University-wide Research Day
- Women in STEM Panel – live streamed
Unconscious Bias Training

• Launched in Fall 2014
• Provost’s mandate to Deans to requires all APT and Search Committees to be trained
• Provost Search Committee completed Training
Leadership Development

• Seminars
  – Dr. Verna Orr: Profiles, Pedigrees and Proficiencies: Influencing the Trajectories of African American Women Postsecondary Presidents

• Follow-the-Leader
  – Shadowing program
  – Uses vast network of women leaders in the DC area

• External Training/Workshops
Mentoring

- Seminar series
  - Mentorship
  - Sponsorship

- Facilitate Interaction with Mentors and Sponsors
Media Campaign

- Media Training sponsored by Office of University Communications (OUC)

- HU ADVANCE-IT Content Development – Media Week
  - STEM stories from 18 Women Faculty
  - Introduction Video for HU ADVANCE-IT website
Disruption Strategies – Connecting Dots…

- Targeted incentives for Women faculty/researchers to convert their research results into businesses producing new technology
  - Patents
  - Industry partnerships

- Targeted training to understand the business of their technology

- Mentoring by Women Entrepreneurs
Thank you.
Disruptive Innovation in Higher Education
Research, the Forgotten Stem Career

STEMconnector Higher Education Council
November 9, 2015 – National Press Club

David Duncan, Program Director and Senior Vice President
Scientific Assessment and Workforce Development
In FY 2015 ORAU facilitated research experience for a wide range of participants

9,401 program participants

- Sponsored by 31 federal departments and agencies
- From 839 US universities and more than 275 foreign universities and 450 precollege schools
- Represented 50 states, DC, Puerto Rico, Virgin Islands, and 107 foreign countries

<table>
<thead>
<tr>
<th>Academic Status</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precollege Students</td>
<td>1,268</td>
</tr>
<tr>
<td>Precollege Teachers</td>
<td>573</td>
</tr>
<tr>
<td>Undergraduates</td>
<td>1,340</td>
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<tr>
<td>Graduate Students</td>
<td>1,077</td>
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<tr>
<td>Recent AS, BS, MS</td>
<td>2,589</td>
</tr>
<tr>
<td>Postdocs</td>
<td>1,852</td>
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<tr>
<td>Faculty</td>
<td>244</td>
</tr>
<tr>
<td>Other Scientists</td>
<td>458</td>
</tr>
</tbody>
</table>
Research experience is invaluable to program participants

Participants are able to:

- See tangible results from their work
- Use state-of-the-art equipment
- Interact with staff scientists and others
- Look for answers to pressing scientific questions or contribute to applied research
- Gain valuable real-world experience
- Add to their CVs
- Network with influential individuals who can advise them on employment opportunities
Disruptive Enhancements to Research Experience
Professional Development Activities


• **Rationale** – Future leaders need a well-rounded workforce with both non-technical and technical skills.

• **Development** – ORAU developed a series of self-contained professional development modules on 8 topics. The modules were authored by retired scientists, ORAU Staff, and university faculty.

• **Implementation** – Modules have been delivered in brown bag, seminar and workshop formats to more than 330 students (undergrads through postdocs).

• **Results** – survey results showed students were well satisfied; scores consistently high (>4.3/5.0) across all modules.
Integrative Research Strategies and Disruptive Learning promote STEM Careers at Tuskegee University

Deloris Alexander and Walter A. Hill
New PhD Programs - Resulted from Disruptive Leadership

- Integrative Biosciences (IBS)
- Agriculture and Environmental Sci. Engin. (AESE)
- Materials Sciences and Engineering (MSE)
- Interdisciplinary Pathobiology (IDPB)
- Integrative Public Policy and Development (IPPD)

> 20 New and Existing MS Programs

Extensive Baccalaureate Foundation
Disruptive Learning via Course-based Research Experiences

• Lab Projects: Students design/conduct authentic research vs. traditional lab experiences

• Approach: student-led, peer/near-peer mentoring, faculty/student teaching, online content/social media, bioinformatics, ethics, community engagement; Oversight from Core Curriculum faculty

• Cross Cutting Labs – PhD Fellows, MS students, Undergraduate STEM and non-STEM Students

Introduction of UG’s to Research via College and Federal Work-study Programs

- Undergraduates never conducted research prior
- Diverse academic backgrounds: Business, Biology, Engineering, History, Clinical Lab Sciences, Chemistry, Animal Sciences, Environmental Science, Mathematics, etc.
- IBS PhD /MS Students: provide near-peer mentoring
- Work-study provided money for college, research provided intro to new career options
Research Naïve  ➔ Research Oriented

Grad School  ➔ Continuing Undergraduate Research  ➔ Med School
Added Value: 

**Disruptive Learning**

Cross Cutting Lab Example
Macon County Graveyard Project

- Students create a searchable, public, database, allowing free access to more than 3,000 graves
- Health Disparities Addressed—White vs. Black Cemeteries
- Students will partner with the University Archives, Foundations, Associations, & City Government
- Students will mine and publish the data they collect in both popular and peer-reviewed formats
Added Value/Incentives:

**Undergraduate Research**

- Publications in peer-reviewed journals
- Honor societies, travel awards and fellowship
- Skills in Scientific Communication, team-work, collaboration
University of Phoenix - School of Advanced Studies

- Practitioner doctorates for working professionals: Research as a tool to influence decision making in organizations
- 10 Virtual research centers – 4 focus on Education
- Diverse student population: 2/3 female, under 40% Caucasian, almost 1/3 African-American females
- Students can bring their own dissertation topic – many choose STEM areas
Effective Enrollment Strategies

Ryan Munce
Vice President
My College Options®
Using the Missouri Innovation Campus Model to Meet Work Force Demands

- Missouri Senate - Senator David Pearce
- University of Central Missouri - Karen Dexter, Innovation Coach, Missouri Innovation Campus
- University of Central Missouri - Dr. Charles Ambrose, President
- VML - Abby Ventrillo, Associate Director, Talent Recruiting

Moderated by Stan Elliott, Director, Missouri Innovation Campus
CURRENT MIC COHORTS

- Systems Engineering Technology
- Drafting and Design Technology
- Computer Science
- CyberSecurity (summer, 2016)
THE MISSOURI INNOVATION CAMPUS

OBJECTIVES
- Lower cost of degree
- Accelerate time to degree
- Eliminate skills gap
- Exclude student loan debt

PROCESS

CONVENING OF MIC STAKEHOLDERS

COLLABORATION-DRIVEN
- Curriculum
- Internships
- Outcomes

EDUCATION AND BUSINESS PARTNERS
DEVELOP CURRICULUM

DEGREE WITH GUARANTEED RELEVANCE
THE MIC PARTNERS

- Business and Industry
- Economic Development
- Higher Education
- Public Schools
- State and Local Government
CRITICAL NEEDS

- Provide access, affordability, degree completion
- Focus on STEM education
- Close skills gap to make workforce globally competitive
- Prepare students for emerging technologies
- College readiness and K-16 Partnerships
BENEFITS FOR STUDENTS

- Lower the cost of higher education
- Accelerate the time to degree
- Provide applied learning experience for students
- Graduate students with little to no debt and direct access to a career
Key to talent pool development is the Lee’s Summit School District’s Summit Technology Academy

Students focus on STEM programs their junior and senior years in high school

Over 20 sending high schools
Mapping Future Development of The Missouri Innovation Campus
Existing and Potential Partners for Innovation Campuses
Why is The MIC called an accelerated degree program?

- Associate’s degree summer after high school graduation
- Bachelor’s degree two years after high school graduation
- Dual admittance to Metropolitan Community College and the University of Central Missouri
PATHWAY

High School

Enrolled at MCC

Applied Learning Experiences through Internships

H.S. Diploma
A.A.S. Degree

Enrolled at UCM

B.S. Degree

EMPLOYMENT
How does The MIC process work for students with three education partners involved?

- Score into college-level work spring semester of sophomore year in high school
- Attend class year-round beginning summer after sophomore year for four years
- Dual credit and college courses during junior year of high school
- Senior year of high school at Metropolitan Community College
- Last two years at the University of Central Missouri
How does The MIC model help eliminate the skills gap for our business partners?

- Program competencies are developed by The MIC Business Partners in collaboration with instructors
- Business partners can eliminate unnecessary skills and emphasize the most important
- Applied, hands-on learning and not just textbook or theory
- Internships are critical in talent pool development
Mapping Future Development of The Missouri Innovation Campus
Existing and Potential Corporate Partners for Innovation Campuses
How does the unique three-year paid MIC Internship benefit business partners and students?

- Early access to talent-talent is available prior to typical graduation periods
- Focus on the hard and soft skills as well as proprietary skills
- Continues value to business partners
- Annual intern placement fee helps to pay AAS degree tuition
- Intern becomes part of business partner culture
What can state legislatures do to promote models like The MIC?

- Enact any possible needed legislative changes
- Additional funding if needed
- Facilitate relationships between business, education and members of the legislature
From a legislator’s viewpoint, how does the State of MO benefit from The MIC program?

- Retain talent in the state
- Provide talent pool for business and industry relocating to Missouri
- Promotes K-16 business partners
- Meets workforce needs with a skilled, trained employee pool
Closing Comments
Questions & Answers
STEM – Technology is Central

- **Colorado Technical University** - Cami Jacobson, Vice President of Industry Strategy
- **Hawkeye Community College** - Dr. Jane Bradley, Vice President of Academic Affairs
- **Marymount University** - Dr. Diane Murphy, Chair, IT, Management Science, and Cybersecurity
- **MESA** - Dr. Jamie Bracey, Founding Director, Pennsylvania MESA and Director of STEM Education Outreach and Research, Temple University

Moderated by Heather Hiles, Founder/CEO, Pathbrite and Senior Education Advisor, Cengage Learning
Closing Remarks

Edie Fraser
Chief Executive Officer
STEMconnector® and Million Women Mentors
Networking Reception

Hispanic Heritage Foundation
1001 Pennsylvania Avenue NW
8th Floor, Suite 1115, Washington DC 20004