Applying an Entrepreneurial Mindset to the Grand Challenges Scholars Program (GCSP)

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Outcomes

• Understanding of EM and its value in GCSP

• Exploration of connections between KEEN EM and NAE GCSP

• Identification of opportunities to further enhance GCSP through EM and EM through GCSP
Agenda

• What is EM and value of EM
• EM + GCSP connections
• Strategies to enhance GCSP + EM connections
WHAT IS EM?
IS DESIGN, PROBLEM SOLVING, AND SKILLSET ENOUGH TO SOLVE THE GRAND CHALLENGES?
Determine design requirements

Perform technical design

Analyze solutions

Develop new technologies (optional)

Create a model or prototype

Validate functions
THESE ARE SKILLS IN THE KEEN FRAMEWORK, AN EXTENSIBLE COLLECTION FOR ENGINEERING EDUCATORS.

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Design</th>
<th>Impact</th>
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<tbody>
<tr>
<td>Identify an opportunity</td>
<td>Determine design requirements</td>
<td>Communicate an engineering solution in economic terms</td>
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<td>Investigate the market</td>
<td>Perform technical design</td>
<td>Communicate an engineering solution in terms of societal benefits</td>
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<td>Create a preliminary business model</td>
<td>Analyze solutions</td>
<td>Validate market interest</td>
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<td>Evaluate technical feasibility, customer value, societal benefits, economic viability</td>
<td>Develop new technologies (optional)</td>
<td>Develop partnerships and build a team</td>
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<td>Test concepts quickly via customer engagement</td>
<td>Create a model or prototype</td>
<td>Identify supply chains, distribution methods</td>
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<td>Assess policy and regulatory issues</td>
<td>Validate functions</td>
<td>Protect intellectual property</td>
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THESE SPECIFIC SKILLS REINFORCE THE DEVELOPMENT OF AN ENTREPRENEURIAL MINDSET
MINDSET + SKILLSET
SKILLSET IS POWER

MINDSET IS DIRECTION
THE 3C’S OF THE ENTREPRENEURIAL MINDSET

**CURIOSITY**
Understand the world around you. Look to the future.

**CONNECTIONS**
Think outside the box. Place old ideas in new contexts. Gain insights.

**CREATE VALUE**
Seek opportunities. Understand Stakeholders. Create an impact.
THE ENGINEER WE NEED
HAS AN ENTREPRENEURIAL MINDSET
COUPLED WITH ENGINEERING THOUGHT
AND ACTION, EXPRESSED THROUGH
COLLABORATION AND COMMUNICATION,
AND FOUNDED ON CHARACTER.
**KEEN STUDENT OUTCOMES**

**ENTREPRENEURIAL MINDSET**

**COUPLED WITH**

**ENGINEERING THOUGHT AND ACTION**

**EXPRESSED THROUGH**

**COLLABORATION**

**AND**

**COMMUNICATION**

**AND FOUNDED ON**

**CHARACTER**

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**EXAMPLE BEHAVIORS**

**CURIOSITY**
- Demonstrate constant curiosity about our changing world
- Explore a contrarian view of accepted solutions

**CONNECTIONS**
- Integrate information from many sources to gain insight
- Assess and manage risk

**CREATING VALUE**
- Identify unexpected opportunities to create extraordinary value
- Persist through and learn from failure

**APPLICATION**
- Apply creative thinking to ambiguous problems
- Apply systems thinking to complex problems
- Evaluate technical feasibility and economic drivers
- Examine societal and individual needs

**COLLABORATION**
- Form and work in teams
- Understand the motivations and perspectives of others

**COMMUNICATION**
- Convey engineering solutions in economic terms
- Substantiate claims with data and facts

**CHARACTER**
- Identify personal passions and a plan for professional development
- Fulfill commitments in a timely manner
- Discern and pursue ethical practices
- Contribute to society as an active citizen
Engineers With an Entrepreneurial Mindset Transforming the World

Mindset + Skillset = Outcomes

https://engineeringunleashed.com/
Entrepreneurial Mindset

- **Curiosity**: Students will demonstrate constant curiosity about our changing world and explore a contrarian view of accepted solutions.

- **Connections**: Students will integrate information from many sources to gain insight and assess and manage risk.

- **Creating Value**: Students will identify unexpected opportunities to create extraordinary value and persist through and learn from failure.

   *Opportunity + Design + Impact*
Entrepreneurial Mindset

“The entrepreneurial mindset is about a certain way of thinking - it is about the way in which you approach challenges and mistakes. It is about an inherent need to improve your skill set to try and try again.”

https://www.forbes.com/sites/theyec/2018/05/25/6-tips-for-growing-with-an-entrepreneurial-mindset/#1904b99c1343
EML Activity:

Build a Duck
Activity Debrief: Connections to EML

• Who is the duck for? Who is the customer?
• Did you use all the parts? Why or why not?
• There is no right way to build a duck.
• How did your duck connect to your previous experiences?
• Who did you create value for?
Activity Debrief: Connections to GCSP

- You have a particular customer in mind (students) although NAE is a stakeholder.
- GCSPs are generally built from existing parts.
- They all look a little different even though they are all recognizable as GCSPs.
- Your GCSP connects students to global issues and builds on their interests and curiosities.
- And you create value for students, institutions, and the world.
Engineers equipped with this mindset understand the bigger picture, can recognize opportunities, evaluate markets, and learn from mistakes to create value for themselves and others.

Mindset + Skillset = Outcomes

https://engineeringunleashed.com/)
Engineers…

• Explore the world with **CURIOSITY** to find opportunities to create value

• Make **CONNECTIONS** between different people, information, and knowledge to develop solutions

**CREATE VALUE** for Society
An “educational supplement...that adds global awareness and social skills with a focus on the Grand Challenges”
“...designed to prepare students to be the generation that solves the grand challenges facing society in this century”

http://www.engineeringchallenges.org/GrandChallengeScholarsProgram.aspx
NAE GCSP Competencies

• Talent
• Multidisciplinary
• Viable
  Business/entrepreneurship
• Multicultural
• Social Consciousness

http://www.engineeringchallenges.org/GrandChallengeScholarsProgram.aspx
How do GCSP experiences contribute to development of EM?
EML + GCSP

- Curiosity
- Connections
- Creating Value

- Research experience
- Interdisciplinary perspective
- Entrepreneurial mindset
- Global perspective, multicultural awareness
- Social consciousness & motivation to solve societal problems
“… More than anything else, an engineer is a problem solver. An engineer walks through life, notices problems, and asks, ‘How can I fix this?... We must never stop questioning, and we must never stop seeking to better and improve ourselves, our community, and our fundamental, global human network.”
Linking EML and GCSP

Dan Muccio ‘16: Chemical Eng., Bucknell University
Hometown: Erie, PA

Grand Challenge(s) of Interest:
Provide access to clean water, restore and improve urban infrastructure, advance personalized learning

Why did you want to become a GC Scholar?
I wanted to become a GC Scholar because it offered me a way to address significant issues within our country. While the core focus of the program involves engineering new solutions to solve large problems, I believe being a scholar will help me gain a new perspective on helping individuals. The program offers a new approach to engineering that focuses on entrepreneurial endeavors as well as humanitarianism. I greatly enjoy my curriculum and helping others, which are strong focal points of being a GC Scholar.

GCSP Faculty Mentors: Jessica Newlin, Mike Toole, Jan Knoedler
How can we use EML to inspire GCSP activities?

• How could you use the EML in existing courses, activities, or programs to inspire GCSP activities?

• Are there new activities, courses, or programs that could be developed to use EML to inspire interest in GCSPs?

• How can you enhance EM development through GCSP?
Examples from EU.com

- “Imagine A World without NAE Grand Challenges or UN Sustainable Development Goals: FRESHMAN Research Class Jigsaw Puzzle Exercise”
- “Exploring Grand Challenges Mindmap Activity”
- “Catalyzing Student Engagement in the Grand Challenges: Speaker Series”
- “Developing Futuristic Solutions to the Grand Challenges”
- “Underrepresented Groups: What is Your Innovative Idea?”
- “Infusing Entrepreneurial Mindset into the Need Assessment of a Technology”
- “Shaping Water Solutions in China”
- “BFAB for Faculty Project - Grand Challenges Foundation Seminar Project”
- “Grand Challenges Wits & Wagers”
- "GCSP Entrepreneurial Experience: Summer Immersion Program"
GCSP Entrepreneurial Experience: Health

June 10-30, 2020 at ASU, Tempe, AZ

- GCSP students collaborate to research, design, and develop a product/service and business plan
- All Expenses paid!
- GCSP Directors: Reserve up to 2 spots today: links.asu.edu/GCSP2020Reserve
GCSP Entrepreneurial Experience: Sustainability (2019)

Links.asu.edu/GcspEntExp
Want to connect to learn more?

• Have an existing GCSP and want to explore links between EM and GCSP?

• Interested in becoming a part of the KEEN GCSP subnet?

• Go to EngineeringUnleashed.com to explore and sign up!