

THE
KEEN
FRAMEWORK

**A GUIDE FOR
ENTREPRENEURIAL MINDSET**



**This is the engineer
we need: One with an
Entrepreneurial Mindset
that is coupled with
Engineering Thought
and Action, Expressed
Through Collaboration
and Communication, and
founded on Character.**

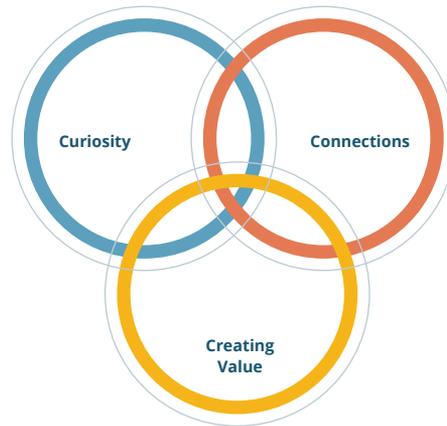
Engineers with an entrepreneurial mindset transform the world. Educators have a role in developing this mindset in the rising generation of engineers.



A Conceptual Framework

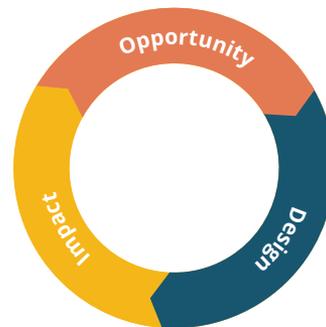
Entrepreneurial Mindset (EM)

The 3C's: Curiosity, Connections, and Creating Value



Engineering Skillset

Adding Opportunity and Impact to Design



Entrepreneurially Minded Learning

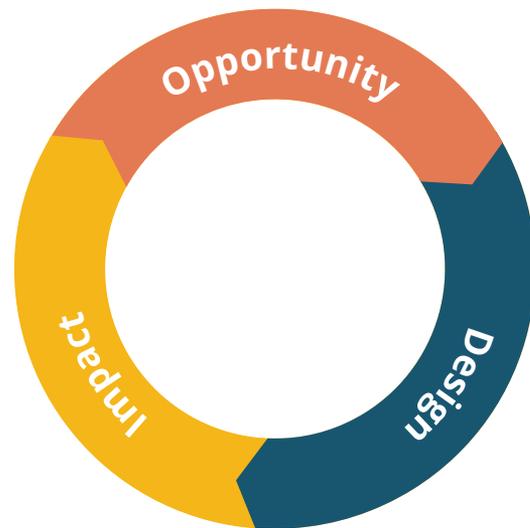
Educational Outcomes to Develop Skillset and Mindset in Students



The KEEN Framework is an adoptable, adaptable guide to entrepreneurially minded learning. With it, faculty can create educational materials and teaching concepts that equip engineering students with an entrepreneurial mindset.

You know the design process well.

Design has been billed as the ultimate act within engineering. But these skills are not enough to equip engineers to transform the world. Design skills must be complemented with opportunity recognition and impact assessment. These are part of the KEEN Framework.



WHAT'S MISSING FROM DESIGN?

By adding opportunity to design, students can refine concepts, think more broadly about the world around them, and understand the customer who they are designing for. The KEEN Framework outlines specific educational outcomes for opportunity skills, streamlining the process for faculty to include specific outcomes in courseware that reinforce the development of an entrepreneurial mindset.

Impact is significance multiplied by scale. Coupling impact skills to opportunity recognition and design implementation will equip students to have an eye for value creation. The KEEN Framework provides specific educational outcomes to develop students' impact skills. This includes communicating an engineering solution in economic terms, validating market interest, identifying supply chains distribution methods, and communicating an engineering solution in terms of societal benefits.

By adding opportunity and impact to your design skills, students will be able to apply creative thinking to ambiguous problems, convey engineering solutions in economic terms, evaluate technical feasibility, and understand the motivations and perspectives of team members and stakeholders.

OPPORTUNITY

Identify
an opportunity

Investigate
the market

Create
a preliminary business model

Evaluate
technical feasibility
customer value
societal benefits
economic viability

Test
concepts quickly via customer
engagement

Assess
policy and regulatory issues

DESIGN

Determine
design requirements

Perform
technical design

Analyze
solutions

Develop
new technologies (optional)

Create
a model or prototype

Validate
functions

IMPACT

Communicate
an engineering solution
in economic terms

Communicate
an engineering solution
in terms of societal benefits

Validate
market interest

Develop
partnerships and
build a team

Identify
supply chains
distribution methods

Protect
intellectual property

These specific skills reinforce the development of an entrepreneurial mindset.

Let's talk about Mindset.

The entrepreneurial mindset consists of three key elements: Curiosity, Connections, and Creating Value—the 3C's. This emergent understanding came from years of work with KEEN faculty, students, and industry.

DEFINING THE 3C'S



Curiosity

In a world of accelerating change, today's solutions are often obsolete tomorrow. Since discoveries are made by the curious, we must empower our students to investigate a rapidly changing world with an insatiable curiosity.



Connections

Discoveries alone are not enough. Information only yields insight when connected with other information. We must teach our students to habitually pursue knowledge and integrate it with their own discoveries to reveal innovative solutions.



Creating Value

Innovative solutions are most meaningful when they create extraordinary value for others. Therefore, students must be champions of value creation. As educators, we must train students to persistently anticipate and meet the needs of a changing world.

3C's

Skillset + Mindset

A Tandem Development

Engineers find success and personal fulfillment when they couple their skills with a mindset to create extraordinary value for others. **The key is an entrepreneurial mindset.** Through educational interventions, you can equip students to understand opportunities, make an impact, and create value for themselves and others.



Entrepreneurial Mindset

COUPLED WITH

Engineering Thought and Action

EXPRESSED THROUGH

Collaboration

AND

Communication

AND FOUNDED ON

Character

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

Apply creative thinking to ambiguous problems

Apply systems thinking to complex problems

Evaluate technical feasibility and economic drivers

Examine societal and individual needs

Form and Work in teams

Understand the motivations and perspectives of others

Convey engineering solutions in economic terms

Substantiate claims with data and facts

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

What to do next?

Eight ways to use the KEEN Framework:

1

Start a conversation.

Talk with other faculty and staff about how important mindset is for student success. Share concepts from the KEEN Framework about entrepreneurial mindset and explore how they might work in different contexts.

2

Build community.

Mindset can be a unifying concept across disciplines. Connect with other parts of your institution to find others who resonate with these ideas.

3

Equip champions.

Integrate the KEEN Framework within your staff and faculty development initiatives. Recognize leaders and showcase work that contributes to the success of others.

4

Transform curriculum.

Start small with a project or module connected to a specific concept in the KEEN Framework, or rethink an entire course. Integrate entrepreneurially minded learning with other pedagogies to further engage your students.

5

Integrate into co-curriculars.

Student orientation, Engineers Week, student competitions – all benefit from concepts from the KEEN Framework. Refresh established events and directly impact students with entrepreneurial mindset.

7

Engage with industry.

The KEEN Framework is relevant to what employers are looking for in your graduates. Gather stories from industry partners on how the 3C's equip employees for success.

6

Assess learning outcomes.

Map the KEEN Framework to ABET outcomes. Learn from others who have done the same. Measure changes in student attitudes, motivations, and dispositions in addition to technical engineering content.

8

Catalyze culture change.

Lead others and inspire transformation within engineering education by emphasizing both skillset and mindset development.



KEEN + **ENGINEERING UNLEASHED**

Transforming Engineering Education



KEEN is a nationwide network of universities that have the shared mission to graduate engineers with an entrepreneurial mindset so they can create personal, economic, and societal value through a lifetime of meaningful work.



Engineering Unleashed is a community dedicated to sharing and expanding these ideas. It is open to any faculty and staff interested in these ideas and learning more about how the KEEN Framework is being applied. Learn more at

EngineeringUnleashed.com