



# THE ENGINEERING MINDSET REPORT



*Engineering Mindset*  
INCLUSIVE MINDSET FOR THE FUTURE

## **A VISION FOR CHANGE IN UNDERGRADUATE ENGINEERING AND ENGINEERING TECHNOLOGY EDUCATION**

We are at a crossroads in engineering education. We can either continue to incrementally improve a system handed to us by our past or design a new system that addresses the challenges we face now and tomorrow.

A young girl with a large afro hairstyle is looking up at a robotic arm in a factory setting. The robotic arm is white and blue, with the text '00817T CRS' visible on its side. The girl is wearing a yellow shirt. The background shows a blurred industrial environment with metal structures and lights.

## A NEW MINDSET FOR A MORE VITAL, DIVERSE FUTURE

The Mindset Report is the result of a multi-year effort to develop key recommendations for changing the landscape of engineering and engineering technology education to better meet the needs of our ever-changing world.

The report evaluates the current state of engineering education and curricula in terms of diversity, inclusivity, pathways, and mindset. The resulting findings and recommendations are clustered around six main themes.



RECOMMENDATION 1

**CREATE FLEXIBLE PROGRAM STRUCTURES  
TO REMOVE BARRIERS**

- 1.** Instead of a one-size-fits-all all-math requirement, incorporate in-context mathematics across the introductory curriculum to help alleviate student inequities due to K-12, economic, first-generation, and other differences.
- 2.** Modularize the engineering curriculum to allow students the flexibility to choose their pathways through fundamental courses and as a means to offer electives on important and emerging topics in engineering and engineering technology.
- 3.** Assess for competency (mastery) and employ formative assessments using techniques such as “ungrading” instead of focusing on current grading and assessment practices.
- 4.** Assess prerequisites to allow for maximum student flexibility and alternative pathways through the curricula.
- 5.** Create student-centered paid internship and co-op programs integrated into engineering curricula that encourage, support, and recognize the value of work experiences.
- 6.** Create curricula and support structures that provide more seamless transitions between engineering technology and engineering undergraduate degree programs while ensuring students are prepared with the necessary skills and knowledge to succeed in their chosen field.



## RECOMMENDATION 2

### EVIDENCE-BASED PEDAGOGY: CREATING A STUDENT-CENTERED ENGINEERING EDUCATION

1. Integrate hands-on and collaborative learning pedagogies that balance student ownership and choice and effectively working with others.
2. Implement methods to support learners both in and outside the classroom (e.g., scaffolding.)
3. Align time and evaluation with expected outcomes via inclusive assessment practices and continuous formative feedback.
4. Engage and support faculty in some form of systematic professional development and evaluation of their educational innovations through scholarly approaches.
5. Identify or create digital technology platforms that need to be built to support alternative approaches to learning and evaluation.

## RECOMMENDATION 3

### AN ACCESSIBLE AND DIVERSE ENGINEERING EDUCATION LEARNING ENVIRONMENT

1. Evaluate the systems in place in our engineering and engineering technology programs and make changes to create a fair and equitable system for all students.
2. Offer professional development on positionality for faculty in order to raise awareness of one's identity and how it influences a person's teaching and everyday interactions.
3. Provide professional development for faculty and staff to support inclusive and equitable teaching practices and foster a mindset that centers on lifelong learning.
4. Modify engineering curricula to emphasize a humanized socio-technical framework.
5. Expand user-centered design practices common within engineering to a whole student-centered design of learning environments (where whole means students' comprehensive identities and experiences are valued, included, and affirmed).

## RECOMMENDATION 4

### PREPARING CAMPUSES FOR A STUDENT-CENTERED ENGINEERING EDUCATION

1. Revise tenure and promotion processes at the department, college, and university levels to reward effort, innovation, and risk-taking in teaching.
2. Reimagine institutional policies that support innovation in teaching and learning.
3. Revise program accreditation requirements to align with the changing needs of our society.
4. Work with and advocate for federal and state governments to increase flexibility in financial aid regulations, including scholarships for year-round and part-time learning.
5. Explore and adopt a different paradigm to support an engineering mindset that fosters a culture of accountability in access and diversity.
6. Track data that matters.

## RECOMMENDATION 5

### LEVERAGING STRATEGIC PARTNERSHIPS

1. Integrate experiential learning for all students in a societal and professional context at the program level.
2. Foster partnerships among accreditation agencies, academia, and industry councils that focus on engineering in a societal context.
3. Facilitate discussion among ABET, NSPE, and academic institutions regarding the divide between engineering and engineering technology.
4. Create a new accreditation option specifically for BS degree programs in engineering technology or modify EAC to include BS engineering technology programs.
5. Form strategic partnerships with community colleges to bring about change, especially regarding credit transfer.
6. Foster broad collaborations to assist PK-12 educational systems in valuing and championing engineering learning.





#### RECOMMENDATION 6

### ENGINEERING A NEW MINDSET FOR ENGINEERING EDUCATION

1. Change the perception of engineering by promoting the idea that engineering is for everyone who wants to be a problem solver, not just those who excel in mathematics.
2. Remove artificial barriers to the engineering profession through a design-by-choice flexible engineering curriculum.

## A NEW MINDSET CAN CREATE MEANINGFUL CHANGE

By making fundamental changes to the undergraduate engineering curricula and institutional structures, we can create a transformative and inclusive engineering educational system for the 21st century and for generations to come.



To learn more, scan or visit:

**mindset.asee.org** to download the New Engineering Mindset Report and check the progress on our upcoming Blueprint for Change.



To contact us, scan or fill out the form on our website:

**mindset.asee.org/contact**



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