Grand Challenges for Education
Unprecedented Disruption

- Thousands of businesses still closed
- Pandemic destroyed millions of jobs
- Drop in unemployment 14x the Great Recession
- College completion rates must overcome remote learning and educational transition
- Pandemic highlights racial inequities in economics and health
Unprecedented Global Challenges

Level 1

Climate change
Water scarcity
Energy security
Cyber security
Global financial structure
Biodiversity and ecosystem losses
Fisheries depletion
Deforestation
Infectious disease

Level 2

Aging population
Poverty
Education
The digital divide
Urbanization
Intellectual property
International labor and migration
E-commerce rules
Biotechnology rules
The Quest for Talent
Maritime safety and pollution

Eliminate our way of life
Disruptive to our way of life
Unprecedented Change

47% of total US employment is at risk
Change Is All Around Us

In the next five years, the following may become obsolete.

• Physical IDs
• Paper currency
• Credit cards
• Store cards
• Business cards
• Photos
• Mail or mail delivery
• Hard copies of books
• Bills and notices
• Paper
• Steering wheels
• Classrooms

No baldness
High IQ
Low risk of Alzheimer’s, breast cancer, and strokes
20/20 vision
Perfect pitch
Sprinter
20/20 vision
High IQ
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Perfect pitch
Sprinter
Unprecedented Speed of Change

Years to 50 million users

More than half of the top 10 in-demand jobs in 2021 did not exist in 2008
Oakley - Radar Pace

Craig Alexander 3X
Ironman Champ
Unprecedented Competitors

SHANGHAI
1987 2019
Price Changes: January 2000 to December 2021
Selected U.S. consumer goods, services, and wages

Source: Mark Perry, Bureau of Labor Statistics
<table>
<thead>
<tr>
<th>Item</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used Cars</td>
<td>+37.3%</td>
</tr>
<tr>
<td>Hotel Rooms</td>
<td>+27.6%</td>
</tr>
<tr>
<td>Furniture</td>
<td>+13.8%</td>
</tr>
<tr>
<td>New Cars</td>
<td>+11.8%</td>
</tr>
<tr>
<td>Groceries</td>
<td>+6.5%</td>
</tr>
<tr>
<td>Appliances</td>
<td>+6.0%</td>
</tr>
<tr>
<td>Shoes</td>
<td>+6.0%</td>
</tr>
<tr>
<td>Clothes</td>
<td>+5.8%</td>
</tr>
<tr>
<td>Shelter (Rent)</td>
<td>+4.2%</td>
</tr>
</tbody>
</table>
Pandemic Positives

• Via remote work, more people have more flexibility over when, where and how they earn their living

• Managers forced to become better communicators, improving employees’ job satisfaction

• Governments doing more to reduce inequality and formulating better-designed systems of employees’ rights and benefits

• Technology has smoothed reallocation. Job-search websites such as Indeed and Monster are now more widely used. This makes it easier for firms to find workers, and vice versa.

• It is also stimulating helpful and long-overdue changes in employment law.
Great Resignation is actually the Great Upgrade

Hires and quits rates by major sector, November 2021

Notes: The private-sector hourly wage rates correspond with the size of the bubbles (the smaller the bubble, the lower the wage rate). The 45-degree line represents where hires rates are equal to quits rates.

The Pandemic Increased Need for Digital Skills

We must prepare graduates in these areas

**Digital Delivery**
- Web development
- User interface design
- Data visualization
- Automated testing techniques
- Application programming interface

**Data Science**
- Mathematical modeling
- Big data analytics
- AI and machine learning
- Web analytics
- Simulation

**Data Engineering**
- Data wrangling
- Cloud computing
- Cloud security architecture
- Data mining
- Data techniques

**Automation & Robotics**
- Robotics
- Automated testing
- Automation
- Computer-aided manufacturing
- Industrial automation
What does all this mean?

• US is transitioning from a national, analog, industrial economy to a global, digital, knowledge economy

• Simultaneous unprecedented grand challenges, change, and competitors

• Exacerbated by the pandemic

• Universities will be transformed dramatically in the aftermath and engineering is key

• Greatest opportunity for massive change and innovation in 50 years!
Demographic Challenges

Enrollment Projected to Drop Sharply After 2025
Forecasted Number of College-Going Students in the U.S. (millions), by Year of High School Graduation

-15%
Decline in College-Going Students (2025-2029)
Engineering Bachelor’s Degrees by Gender

[Graph showing the percentage of engineering bachelor's degrees awarded to females and males from 2010 to 2019.]
Engineering Bachelor’s Degrees by Race/Ethnicity

*Data on ethnicity does not include foreign nationals. American Indian/Alaska Native (0.4%), Native Hawaiian/Other Pacific Islander (0.2%) and Multiracial (3.7%) are combined under Other.
It gets worse...

Between 2026 and 2031 the number of high school graduates is expected to drop by 9 percent and those students who remain are likely to be more diverse (fewer White students and more Hispanic) with a greater range of academic abilities (fewer high scorers on SAT and ACT) and stagnant family income.
Much worse...

Given that engineering typically engages between 5%–6% of first-year engineering students, what are the implications for engineering enrollments with these indicated changes?
Post-Pandemic Success

• Moonshot-sized K-12 outreach and engagement, coupled with a similarly sized internship effort
  – Foundations, NSF, Department of Education, Department of Energy, and Department of Defense must work together to triple the number of national successful programs in STEM
• We know what works. Implement and scale!
• Meet students where they are
  – The system is broken, not the student!
  – Mason ADVANCE program and the Mason Virginia Promise
• Establish Upskilling – Reskilling programs based on certificates and badges (not degrees)
• Partner with employees – Mason Talent Exchange
Scale Programs that Work

• Expand transfer pathways
• Corporate talent partnerships
• Culturally relevant K-12 outreach
• Rethink our budget model (3-year degrees, certificates)
• From Summer Bridge to Summer Transition programs
• 100% of student-need scholarships
• Faculty development programs
• Collaborative learning (and living) environments
• Positive self-efficacy and identity development
Access to Excellence

The Mason Virginia Promise:
A pathway toward a bachelor's degree or your own business for **EVERY** Virginian who wants it.

- Plan to meet 100% of student need
- Expanding into other community colleges
- Based on expanding ADVANCE and our Early Identification Program (EIP)
Virginia community college students accumulate nearly a semester’s worth of excess credits by the time they earn a bachelor’s degree.

- 61% earn no credential or degree
- 24% earn a credential
- Only 15% complete a bachelor’s degree within 7 years

The Purpose of ADVANCE

- Increase number of NOVA students who **GRADUATE** with 2-year and 4-year degrees
- Decrease **TIME** it takes to graduate
- Decrease the **COST** and the excess credits
- Improve **ADVISING** and **STUDENT SUPPORT** for transfer students
Program Highlights

Enrollment Highlights
- 1,708 active students, 155 for Spring 2021
- 60% students of color
- Fall 2018 retention rate of 83% and the Spring 2019 cohort of 190 students has a retention rate of 89%, compared to First-Time at NOVA Associate Degree-Seeking Students at 65%
- 4 students graduating this year

Notable Mentions:
- Started scholarship fund for unpaid internships through the Strada Grant
- Distributed over $200,000 to more than 100 scholarship recipients
- Launched the Career Accelerator Tool
- Created All-ADVANCE Team Meeting and Community Resources Site

Total enrollment: 1806
First-generation 48%

175 students matriculated to Mason in fall 2020

Pell-eligible 61%

TOP PATHWAYS:
- Cybersecurity AAS to BAS
- Business Admin AS to Business Management BS
- Nursing AAS to Nursing BSN
- Science AS to Biology BS

Brand new 36% to NOVA
WHAT
EMPLOYERS NEED

ACCESS TO TALENT
WITH HIGH-QUALITY CREDENTIALS
AND PROFESSIONAL EXPERIENCE

HOW WE CAN HELP

MASON TALENT EXCHANGE
The Solution: The Mason Talent Exchange

**Employer Needs**
Employer describes skills, certifications, job needs

**Mason Aligns Micro-Credentials**
Mason creates micro-credentials (non-credit)
- *Fast* — Can be completed in 90 days
- *Low cost* — via Mason Presidential Scholarships

**Employer Provides Support**
- Resumé review/ interviews
- Experiential learning opportunities
- Scholarships
Thank You!

Merci Bien!
Vielen Dank!
Obrigado!
Tak!
Asante Sana!
¡Muchas Gracias!

感激!
감사합니다!
谢谢!
спасибо!
Евхаристω!
Спасибо!