

ETHICS-2023 Session A2 - Panel: The arc of a global engineering education

ETHICS-2023 Special Session/Panel, Friday, May 19 2023, 10:30 am – 12:00 noon ET.

Panelists

Moderator

Dr. Laura MacDonald

Managing Director,

Mortenson Center in Global Engineering & Resilience

Dr. Laura MacDonald

Managing Director,

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Dr. Jessica Rush Leeker

Faculty Director of Undergraduate Education,

Lockheed Martin Engineering Management Program

Brenton Kreiger

Bridge Program Education Manager,

Engineers in Action

Iana Aranda

President,

Engineering For Change

I. INTRODUCTION

Since 2009, the Mortenson Center in Global Engineering & Resilience has been training global engineers to improve the lives of vulnerable people through technological innovation, forming global partnerships, enacting policy changes, and humanitarian service. In 2021, The Mortenson Center hosted over 100 participants from universities, donors, government agencies, and industry partners for a virtual workshop series as part of a National Science Foundation grant to advance engineering education. Together, that group established a comprehensive global engineering body of knowledge. The paper *Aligning learning objectives and approaches in global engineering graduate programs: Review and recommendations* by an interdisciplinary working group were recently published in *Development Engineering*.

Fifteen priority learning objectives emerged from the workshop. Among them was Global Engineering Ethics. Students receiving global engineering education need to be able to examine the ethical implications of global research and development, including considering power imbalances and recognizing the limitations of engineering in guiding global development efforts. Our panel will encompass the intersection of industry, academia, and government and the social and ethical responsibilities of the global engineer. Global engineering ethics is a thread that runs throughout the arc of global engineering education, and our panel will speak to the future of socially responsible innovation, as that is also foundational to the field of global engineering. We will discuss four essential pillars in the arc of becoming a global engineer.

II. SESSION SYNOPSES

A. Formal Education – Dr. Laura MacDonald

Dr. Laura MacDonald was the lead author of the paper previously referenced that built a consensus around Global Engineering pedagogy. Among the essential tools a Global Engineer needs is the ability to analyze the historical and contemporary context of global inequalities and global development, poverty alleviation policies, programs, institutions, laws and regulations, and social movements. A student needs to be able to identify alignments and gaps in research and practice within this context. Only then can they innovate and design solutions to address global poverty and inequities.

B. Skill Building – Dr. Jessica Rush Leeker

Outside of the classroom, informal engineering education allows students to continue to learn about and incorporate ethical action into their learning. An example of this skill-building Global Engineers can engage in is a multi-university project headed by Dr. Rush Leeker that studies questions around sustainable community-agricultural-land infrastructure and climate resiliency, with students working on 25 acres of land owned by the nonprofit Harvest Dreams for research near Tuskegee University. The project builds cultural empathy and understanding between students at both universities as they work to create both socially and ecologically sustainable growth.

C. Service Learning – Brenton Kreiger

Service learning is a critical step for Global Engineers and allows for the opportunity to work with partners in low-resource settings. This humanitarian focus in engineering drives socially responsible innovation because a student is learning about community needs and cultures firsthand. We have seen that technological innovation that does not consider the setting and social context in which it is being employed has not been effective long term. Service learning projects frame the experience as a collaboration, empowering the community and deriving longer term impacts. As Director of the Engineers in Action (EIA) Bridge Program, Ethan Gingerich has overseen 100+ successful collaborations with over 35 universities and 12 countries across the world. The EIA Bridge Program continues to connect Global Engineers to service learning opportunities while emphasizing the ethical implications of global infrastructure development. The organization has independently examined the impact and ethics of service learning in “Educating Global engineers Through Footbridges” and “Reevaluating Traditional International Service-Learning During a Global Pandemic”.

D. Internship – Iana Aranda

The fourth piece in a well-rounded global engineering education arc is working with a multilateral agency, non-profit, social venture or government organization and is accountable for deliverables. As President of Engineering for Change (E4C), Mortenson Center Board Member Iana Aranda oversees E4C’s capacity building strategy, including the E4C Fellowship Program. This is a workforce development program at the intersection of technology and social impact, serving to activate and empower early-career engineers, architects, scientists, and technical professionals worldwide to solve local and global challenges and advance the United Nations’ Sustainable Development Goals. This type of experience will pave the way for a successful career in Global Engineering.