ENGINEERING JUSTICE: TRANSFORMING ENGINEERING EDUCATION AND PRACTICE

Jon A. Leydens and Juan C. Lucena
Division of Liberal Arts and International Studies
Presentation Overview

I. Background
II. Engineering for Social Justice Criteria
III. Course Examples
IV. Future Work
V. Acknowledgements
I. Background

What catalysts led to this work on SJ?

Why integrate SJ now?

Why might SJ increase interest in engineering?
What catalysts led to this work on SJ?

Community Development

Socioeconomic Class

Climate Change and Inequality

Broader Social Impacts

Student Engagement and Active Learning
What catalysts led to this work on SJ?

Engineering Problem Solving

Sociotechnical Problems

Purpose of Engineering?

Innovative Scholar-Teachers
Why integrate SJ Now?

Community Engagement

Engineering for Key Problems of 21st Century

Making Inherent SJ Dimensions Visible
Why might SJ increase interest in engineering?

Making Relevance Visible

Beyond the Bottom Line

Expanding Corporate Values
II. Engineering for Social Justice Criteria

We define SJ as engineering practices that strive to **enhance human capabilities (goal)** through an equitable distribution of opportunities and resources while reducing imposed risks and harms (means) among agentic citizens of a specific community (drawing from Barry, 2005; Capeheart & Milovanovic, 2007; Nussbaum, 2001, 2007).
In relationship to engineering, we define SJ as engineering practices that strive to **enhance human capabilities** (goal) through an equitable distribution of **opportunities and resources** while **reducing imposed risks and harms** (means) among agentic citizens of a specific community (drawing from Barry, 2005; Capeheart & Milovanovic, 2007; Nussbaum, 2001, 2007).
Social Justice Criteria

1. Contextual Listening
2. Identifying Structural Conditions
3. Acknowledging Political Agency/Mobilizing Power
4. Increasing Opportunities and Resources
5. Reducing Imposed Risks and Harms
6. Enhancing Human Capabilities
6. Enhancing Human Capacities

This is the end goal, why we do 1-5.

| 1) Life (or a normal length) | 6) Practical Reason |
| 2) Bodily health | 7) Affiliation |
| 3) Bodily integrity | 8) Other Species |
| 4) Senses, imagination, and thought | 9) Play |
| 5) Emotions | 10) Control over one’s political and material environment |

Nussbaum 2007; 2011
III. Course Examples

Engineering Design

Engineering Sciences

Humanities and Social Sciences
Engineering Design

Biology in Engineering at LSU

Listening Contextually to Identify Structural Conditions and be able to Acknowledge Political Agency/Mobilize Power.

Agentic Citizens
Engineering Sciences

Source: Lucena and Leydens, 2015, ASEE

Feedback Control Systems

Feedback Control Systems

Listening Contextually to Identify Structural Conditions and be able to Acknowledge Political Agency/Mobilize Power, Increase Opportunities and Resources as well as Reduce Risks and Harms.
Humanities and Social Sciences

Engineering and Sustainable Community Development

Engineering and Social Justice
IV. Future Work

ASEE 2015


Foci: E4SJ Criteria in three components of engineering curriculum: engineering design, engineering sciences, and HSS for engineers.

Recognizing diverse knowledges that students bring to engineering.
V. Acknowledgements

Students in ESCD and ESJ


This material draws from work supported by the National Science Foundation under Grant No. EEC-1441806. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

We would also like to thank the Dr. Lima (Biology in Engineering) and Dr. Johnson (FCS) for their thoughtful collaboration and experimentation.

For More Info: jleydens@mines.edu or jlucena@mines.edu
Key References


Comments and Questions