# Design for Social Justice: A set of principles of engineering design

**Source that presents the criteria:**
Leydens, J., Lucena, J., Nieusma, D. What is Design for Social Justice? *121st ASEE Annual Conference & Exposition,* Indianapolis, IN, June 15-18, 2014.

**Example of using the criteria in OSU capstone design project:**
Burleson, G., Butcher, B., Goodwin, B., Sharp, K., Ruder, B. Soap-Making Process Improvement: Including Social, Cultural and Resource Constraints in the Engineering Design Process, *International Journal for Service Learning in Engineering, Humanitarian Engineering, and Social Entrepreneurship*, vol. 12, no. 12, pp. 81-102, Fall 2017.

**Summary:**
- Design process is motivated by the goal of equitable distribution of opportunities and resources in order to enhance human capabilities while reducing imposed risks/harms
- Involves both listening to the local context and the structural conditions that give rise to inequalities (engineers have much more experience with the notion of contextual listening but very little with structural listening)

**Six criteria:**
**\*A & B occur during the learning phase while C-G are actively engaged by designers**
   A. *Listening:* In the research phase, engineers must listen for specifications, for consumer desires and needs, and for empathy. But, they also must listen in ways to identify structural conditions that give rise to community needs. From the paper: "information such as cost, weight, technical specs, desirable functions, and timeline acquires meaning only when the context of the person(s) making the requirements (their history, political agendas, desires, forms of knowledge, etc.) is fully understood."
   B. *Identifying structural conditions that give rise to needs:* As a rule, design often treats structural conditions as background conditions (givens that only need to be identified or often not even acknowledged).
   C. *Increasing human rights:* Multiple stakeholders are often involved in a design project. Designers should ask "whose rights are augmented by this project, and how?" The design should focus on increasing the rights of the people (not businesses or privileged) and, even better, empower users of the product.
   D. *Increasing opportunities:* Designs that allow people to do something they weren't able to do before.
   E. *Increasing resources:* Designs that allow people to access something they weren't able to before.
   F. *Reducing imposed risks and harms:* Designs that focus on mitigating unintentional risks to the user.
   G. *Enhancing human capabilities:* Designs that focus on improving the aspects that make "life worth living": life (of normal length), bodily health, bodily integrity (i.e nonviolence, moving freely), senses, imagination, thought, emotions, practical reasoning (i.e thinking, religion, opinion), affiliation (i.e institutions, identities, orientations), other species (how

we interact with nature), play (recreation), and control over political and material environment.

**Examples of how to use this from three classes:**

| | Human-Centered Problem Definition, HE Program, Colorado School of Mines | Participatory Design Studio, Programs in Design Innovation, Rensselaer Polytechnic Institute | Biology in Engineering Course, Biological Engineering, Louisiana State University |
|---|---|---|---|
| **A. Listening** | Contextual listening to individuals and to communities; activities include listening to self and to multiple others affected by design. Also, identifying all potential "affectees" of a design, and to go listen to a selection of them. | Basic and contextual to users as they reflect on their personal, educational, and cultural experiences, needs, and desires. | Basic and active contextual listening to ascertain and design for the "soul of the community" via a three-part interaction-reflection-action process. |
| **B. Identifying Structural Conditions That Give Rise to Needs** | This may occur indirectly, subtly via shadowing and other activities. | Part of systematic background research carried out by design teams. | Occurs implicitly via contrasting public vs. private education, transcending privilege guilt, and contextualizing integration/segregation by understanding trajectory since Brown vs. Board of Education. |
| **C. Increasing human rights** | Not explicitly integrated, but this may arise via empathy-building activities. | Not explicitly integrated, but arises indirectly through assessment of educational structures in place in the local, state, and national contexts. | Can emerge from reflecting on the question, "What is the role of an engineer in a democratic society?" Also can surface via ability and geographic-related accessibility issues. |
| **D. Increasing opportunities** | Via multiple activities, human-centered design specifically aims to facilitate understanding of the ways in which design can increase opportunities and resources as well as decrease risks and harms. | Increasing opportunities and resources is targeted directly through creation of new educational experiences and tools and indirectly through educational advancement. | Increasing opportunities for accessibility, ownership, and play. |
| **E. Increasing resources** | | | Almost 30 playgrounds constructed to date. |
| **F. Reducing risks and harms** | | Means of reducing risks and harms is not explicitly integrated, but arises indirectly through educational advancement. | Occurs via confronting safety and liability issues and designing to decrease social/emotional conflicts. |
| **G. Enhancing human capabilities** | This is an overarching, aspirational ideal for HCPD that grows from a seed: identifying what constitutes a need and the type of need, and later how people experience that need (via shadowing, etc.) and from case studies of empowerment via designs that enhanced community members' capabilities. | This is the overarching goal of the course—to enhance capacity of users through STEM education approaches and technologies that are culturally responsive. | This is an overarching goal and outcome of the course, and multiple capacities are engaged in important ways. Capacity building focuses on both university design students and all community partners, particularly elementary school students. |

**Problem Example:** Some buildings on OSU campus, such as Rogers Hall (Monroe-side entrance), were built before the U.S mandates on accessibility for persons with impaired mobility. Students are assigned to design a solution to provide an ADA compliant entrance for individuals in wheelchairs, with crutches etc. Prior to design work, students must analyze and discuss the social justice design criteria (parts A and B).

**Solution:**

**(A) Listening:** List out some stakeholders and list desires/needs each would have.

| Stakeholder | Desires/Needs |
|---|---|
| Wheelchair user | **Ramp**: An ideal ramp must have a minimum width that does not over constrain users. Ramp must be a smooth surface, with long term fatigue characteristics such that the ramp will not be easily damaged. The ramp must have low angles of inclination, such that users will not have to work excessively to summit the ramp.<br><br>**Door:** Door must be wide enough to accommodate all wheelchair users. Door must have a reliable automatic opening system. |
| Unimpaired user | **Stairs:** In addition to the ramp option, the entrance should also include stairs for more direct access. Stairs should not be excessively steep. Entrance should also include bike locking area. |
| Citizens of Corvallis | **Construction**: Citizens of Corvallis expect a timely construction of the ADA compliant entrance. Construction should not provide excessive noise, and should not require blocking of Monroe Avenue. |
| Oregon State University facilities development group | **Construction:** OSU facilities group requires a timely construction of the ramp, such that impaired and unimpaired students and faculty members may use entrance when needed. OSU desires to optimize the cost of the entrance design by contracting a reliable construction company with experience in ramp/entrance design. |

**(B) Identifying structural conditions that give rise to needs:**

| Structural Condition | Description of Barrier |
|---|---|
| Economics | The cost of contracting a company, purchasing materials, and renting equipment could be costly for Oregon State. This could be a barrier to the construction of the new entrance. |
| Historic Cultural Attitude | Rogers hall was constructed in 1967. As time has moved forward since the initial construction of the building, the Oregon State community has worked to create a more inclusive campus. Historically, creating all-inclusive entrances around campus was not of the same value as it is now. Therefore, historic cultural attitude may have contributed to the lack of inclusive entrance to Rogers Hall. |
| Local Government | In order to produce an ADA compliant entrance, Oregon State would have to coordinate with city planners to ensure city construction code is met. Meeting city construction code can be difficult, therefore, local government could serve as a barrier for constructing an ADA compliant entrance. |

As tabulated above, the entrance needs to address a series of stakeholders with respective desires for the design. Structural barriers such as economics, historic cultural attitude, and local government may have contributed to the lack of development of the ADA compliant entrance. Acknowledging this information can lead to a more positive design output.