CHAPTER 5

Listening to Community[1]

At the first Senior Design team meeting in the fall semester, the enthusiasm was almost palpable. Although several engineering students had requested to work on a community development project, only a few had been chosen. For the project, village leaders in Honduras had requested a system that would bring clean drinking water to their remote village. One of the five team members summed up the spirit of the team when she said, "We've waited four years for this. Finally, we get a chance to *do* something real and meaningful with our engineering knowledge." Eager to begin, the Senior Design team brainstormed several possible types of water systems. Before long, they were discussing whether their spring visit to the village could be an implementation visit.

That discussion soon changed. At their next meeting, the Senior Design instructor listened to the team's goals and said, "We know the village leaders want the water system. But how do we know that this is what the whole community wants? And if so, what kind of system does the community prefer? What are their perspectives?" Silence filled the room. No one could answer those questions. In their enthusiasm, the team realized that they had forgotten about listening to the perspectives of those who would be most impacted by the system.

To their credit, the team quickly rebounded. Their spring visit involved the Spanish-speaking team members conducting face-to-face surveys, including house-to-house visits, and community meetings to better understand more about community members' perspectives.

Another team of students was bound for a village in India, where a civil engineering faculty member led their work on a water and sanitation project. Or so they thought. Once they arrived, they listened to the village in a participatory and consensus-building process designed to identify and define community desires. That process unveiled a completely different project than the one initially proposed by village leaders: once all perspectives had come to the fore, the village actually preferred a power-generating windmill. (We will say more about this case in Chapter 6, including about the complexities associated with the community's choice.)

Both of these are actual community development cases that underscore the importance of the willingness to listen to multiple perspectives. However, their existence should not give the impression that effective listening is commonplace in sustainable community development (SCD) contexts. Indeed, as the previous chapter on community accentuated, the history of SCD is rife with project failures. William Easterly highlights this point when he illuminates the tragedy of a half-century of well-intentioned but often ill-conceived development, which resulted in the West

[1] Some parts of this chapter originally appeared in a publication by Leydens and Lucena, "Listening as a Missing Dimension in Engineering Education: Implications for Sustainable Community Development Efforts," in *IEEE Transactions on Professional Communication,* Vol. 52, No. 4, December 2009, pp. 359-375.

spending 2.3 trillion in foreign aid, yet the development industry "still had not managed to get twelve-cent medicines to children to prevent half of all malaria deaths,…[or] to get four-dollar bed nets to poor families,…[or] to get three dollars to each new mother to prevent five million child deaths" (Easterly, W., 2006, p. 4).

Reasons for those failures are complex and multifaceted, and this chapter explores one of them: failure to listen effectively to community perspectives. Unfortunately, examples of engineering for development cases wherein ineffective listening occurred are all too common (e.g., Adas, M., 2007; Easterly, W., 2006; Jackson, J., 2005; Shiva, V., 1993; see also Chapter 4). After briefly exploring two such cases, we will

- Discuss how listening is positioned within engineering education,
- Define and describe the dimensions of contextual listening,
- Identify barriers to and benefits of contextual listening, and
- Propose an alternative problem-solving, listening-centered approach suited to SCD contexts.

Exercise 33 *How would you define effective listening within the context of SCD projects? List what you consider the primary components or dimensions of effective listening.*

5.1 LISTENING IN BIG DEVELOPMENT: THE EL CAJÓN DAM CASE

How do large development organizations, such as the World Bank, listen to the people they are supposed to serve? What's going on when these organizations allow public comment on development projects beyond and within the affected communities?

Consider the case of El Cajón Dam. In his meticulously researched book *The globalizers: Development workers in action,* Jeffrey Jackson tells how major players in the development industry, including the World Bank (WB), Inter-American Development Bank, and corporate dam contractors, carried out the design and build phases of El Cajón. Situated along the Humuya River in Honduras, El Cajón Dam, completed in 1984, was designed to decrease dependency on foreign oil and provide enough electricity not only for Honduras but for Honduras to sell to neighboring countries.

Yet during pre-implementation, the project received much public protest, including from Honduran engineers and policy makers. For instance, organizations such as the Honduran Society of Civil Engineers and the Honduran Forestry Commission expressed concern about the risky nature of the dam project. Even the union of the Honduran national electric utility, which stood to be a primary recipient of the dam's potential wealth-generating capacity, opposed the dam project for being too large.

The WB itself recognized that the project cost was tremendous relative to the size of the Honduran economy; the total project cost would constitute over 50 percent of Honduras' annual economic output and four times its annual government revenues. By contrast, a similar project in the US would cost a much smaller fraction of such output and revenues (Jackson, J., 2005).

Further, the WB was aware of the public opposition to El Cajón. For instance, during the public comment phase, the WB received letters from two Honduran engineers, who echoed local community perspectives in opposing El Cajón on three grounds: "its high cost, potential for endangering the downstream population in the event of a failure of the dam, and above all, diverting scarce resources from other development needs" (Jackson, J., 2005, p. 168 quoting WB internal correspondence). However, for multiple complex reasons, officials at the WB were not interested in listening to diverse perspectives. Regarding the Honduran engineers' concerns, WB staff wrote in internal correspondence that "The Bank's files contain two unsolicited screeds by Honduran engineers…. Parts of these obliquys [sic] are quite poetic…" (Jackson, J., 2005, p. 167). A screed refers both to a personal letter and to a ranting piece of writing. Obloquies refer either to condemning or abusive language or to a situation in which someone is discredited or has a bad reputation. WB staff continued the dismissive, patronizing tone by noting, "Such complaints are not unusual, and the Bank's refusal to be drawn in to a debate was the correct stance" (Jackson, J., 2005, p. 168).

In many ways a dam designer's dream, El Cajón held much promise (see Figure 5.1). Its designers said it would serve not only to bolster the Honduran energy infrastructure but also to enable Honduran self-sufficiency and the capacity to generate revenue from excess electricity reserves. Technologically, the dam was considered state-of-the-art at the time (mid-1980s). At 741 feet tall (nine feet taller than Hoover Dam in the US), the dam was the eighth highest in the world. It "spanned the 1,253-foot wide canyon using an 'elegant doubly curved maximum cantilever' variable radius parabolic arch design 'based on membrane theory'" (Jackson, J., 2005, p. 163). According to one project consultant, the dam represented "a half century's progress in concrete arch dams" (Jackson, J., 2005, p. 163). Further, feasibility studies identified the Humuya River as the site most likely to produce "maximum power-generation potential at the lowest construction cost" (Jackson, J., 2005, p. 156). Flood control and irrigation were also touted as benefits. The estimated $35 million in petroleum savings would mean the cost of the dam would be paid off in roughly 20 years (Jackson, J., 2005, p. 162), as the four turbines combined would produce 300 megawatts of electricity daily.

Despite its great promise, the outcome of El Cajón was disastrous. Although the reasons for its failure are too many to describe here, many of them aligned with the local perspectives. Such perspectives consistently included resource concerns:

- The dam's high cost placed Honduras in tremendous debt, which had an exponential effect when Honduran currency later devalued.

- When the predictions for rising oil prices were not fully realized, expected revenues were smaller.

Figure 5.1: El Cajón Dam in Honduras (Wikimedia Commons, 2009).

- Much of the public protest also centered on placing too many of Honduras' energy eggs in a single basket. Even some engineers working on the El Cajón project were in favor of an alternative plan to build five smaller dams at diverse points around Honduras (Jackson, J., 2005, p. 167).

However, largely for bureaucratic reasons, the WB preferred to make large loans (Jackson, J., 2005, p. 153).

In 1986, just two years after the dam's completion, one of the four turbines failed and was sent to Switzerland for costly repairs; in the same year, cracks appeared in the cement grout used to plug holes in volcanic rock near the dam, and those were fixed by 1990—after Honduras had dished out another $72 million for repairs. Since the desired 50 or 100 years of water level data were not available, water level estimates had been extrapolated from rainfall data from 1967 to 1978 (Jackson, J., 2005, p. 158). By 1996, droughts had left the reservoir two-thirds full, one hundred feet below expected water levels, and the dam was operating at 60 percent of its electricity-generating capacity (Jackson, J., 2005, p. 151). The dam has since been plagued by other problems.

What role did listening play in the failure of El Cajón Dam? Jackson indicates that the WB's response to public opposition

> implies the bank had no responsibility whatsoever to reply to the concerns of Honduran citizen's groups opposed to the plan, and the very grounds on which El Cajón was being

> criticized by these groups did in fact turn out to be valid. Indeed, the same [WB] report later concludes that these 'dissidents' were right (Jackson, J., 2005, p. 168).

This case reinforces the importance of the responsibility of designers, especially SCD designers, to listen and be accountable to the diverse stakeholder perspectives that arise within any SCD project, large or small. Certainly all the problems associated with the El Cajón Dam cannot be blamed on the failure to listen to local perspectives. However, that failure is a significant component in the El Cajón case. History might very well have been different if instead of dismissing legitimate concerns as "screeds" and "obloquies," the WB had seriously listened to those perspectives and included them in the debate.

Unfortunately, the lack of effective listening seen in the El Cajón Dam case is all too common in engineering for development work, as manifested by cases involving different circumstances, times, and contexts—but similar outcomes (e.g., Adas, M., 2007; Burkey, S., 1993; Easterly, W., 2006; Shiva, V., 1993; Slim and Thomson, 1995; Salmen, L., 1987; Mason, K., 2001).

5.2 LISTENING IN LITTLE DEVELOPMENT: BRICK MAKING KILNS IN PESHAWAR, PAKISTAN

Perhaps you are thinking that listening is difficult in the context of large development projects such as El Cajón because of the bureaucratic and political nature of large development loans. Perhaps listening happens more easily in smaller development projects. Yet this might not be the case either. In another instance, technology transfer also had negative effects, and engineers' lack of listening was part of the problem (Mason, K., 2001). In the early 1990s, an attempt was made by well-intentioned community development organizations to modernize the brick making operations in Peshawar, Pakistan, by replacing what was considered an outmoded, inefficient kiln with a vertical shaft brick kiln (VSBK), seen in Figure 5.2. Compared to the "outmoded" kiln, the VSBK had higher energy and fuel efficiency and lower pollution emissions.

Despite that technological promise, the kiln modernization process failed for a number of reasons. First, no one listened to the local perspectives on the scale of their brick making operations: the VSBK had a lower production capacity (4,000-7,000 bricks in 24 hours) than the old kilns (7,000-28,000 bricks in 24 hours), so it was less suitable to the medium-scale operations in Peshawar.

A second reason had to do with training. Fortunately, the consulting Chinese engineers who had perfected the VSBK built and ran the kiln and conducted on-site training. However, the training lasted only a few weeks, which did not allow enough time to work out significant kinks in the production process. Further, the Chinese engineers did not spend enough time listening to the local brick makers' knowledge of why their old system worked well. As it turns out, the quality of the local coal and clay was different enough from Chinese coal and clay that the VSBK in Peshawar produced many over- or under-fired or broken bricks. Clearly, a more thorough and participatory investigation of local practices, including both soil and coal tests as well as listening to local perspectives on current practices, could have produced more favorable results (Mason, K., 2001).

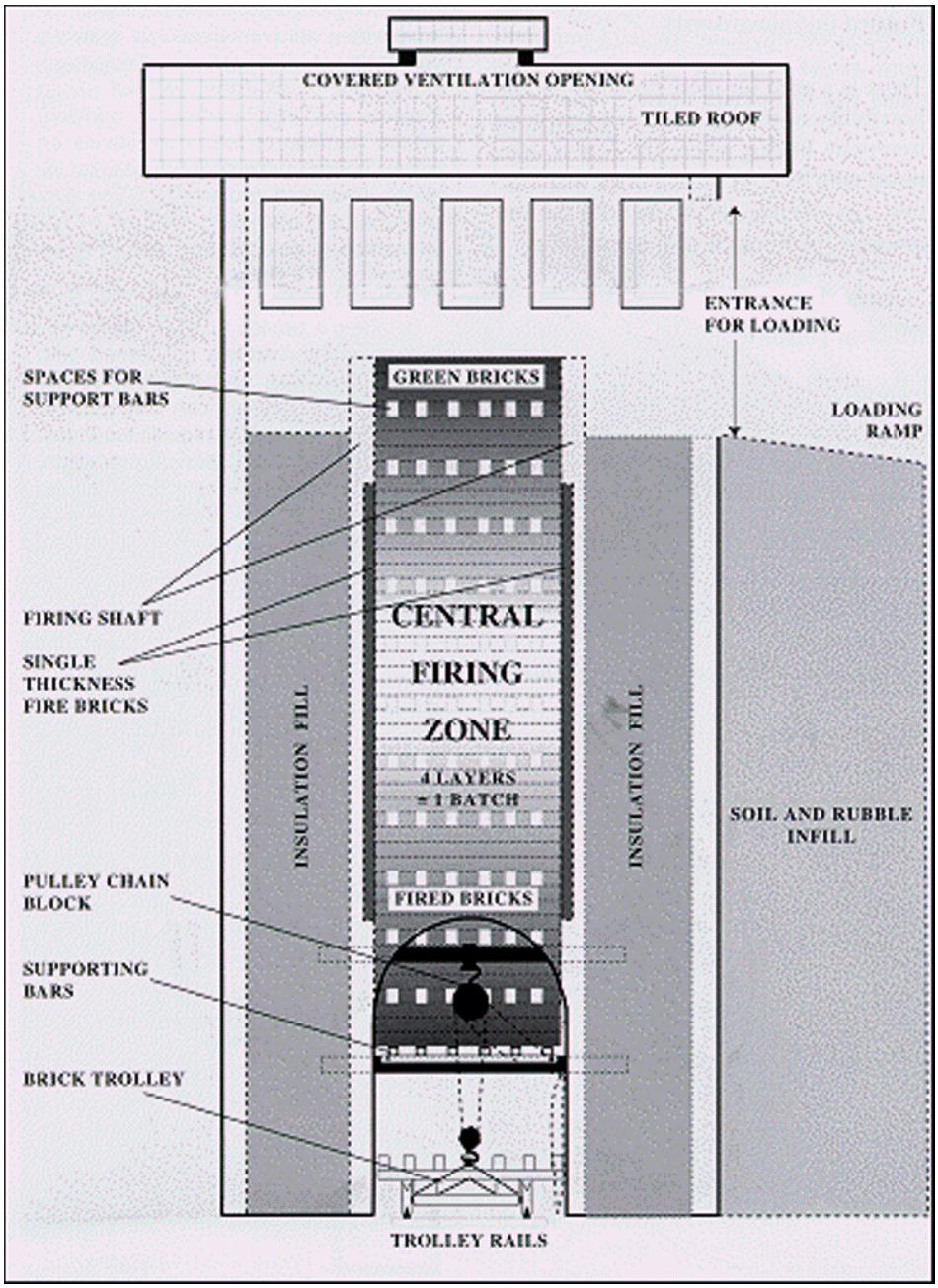

Figure 5.2: Cross-section of a VSBK with single shaft, chain block unloading. (Source: `http://www.basin.info/gate/vertical.htm` Credit: GATE International.)

In El Cajón, in the brick making case, and in other cases, the project outcomes could have more successfully promoted sustainability, community, and development—if there had been contextual listening to community perspectives. Contextual listening is described in more detail later in this chapter.

5.3 WHERE IS LISTENING IN ENGINEERING EDUCATION?

Before diving into the kind of listening required for effective work in SCD, it is important to understand the place that *listening* occupies in your engineering education. The exercises below serve as an opportunity to explore the role of listening in engineering education curricula.

Exercise 34 *What role has listening instruction played so far in your engineering education? As background, consider these facts:*

- *The National Academy of Engineering's profile of the Engineer of 2020 accentuates listening. Specifically, they "…envision a world where communication is enabled by an ability to listen effectively as well as to communicate through oral, visual, and written mechanisms" (National Academy of Engineering, 2004, p. 55).*
- *Leaders behind Project Kaleidoscope, an initiative designed to transform US undergraduate science and technology education, underscore the importance of empathy as "critical to effective collaboration, building trust and resolving differences in viewpoint. It also requires the cultivation and use of what is probably our most neglected communication skill: listening" (Astin et al., 2003, p. 13).*
- *In the American Society of Civil Engineering (ASCE) body of knowledge for the 21st century, one of the professional outcomes focused on "[m]eans of communication [that] include listening, observing, reading, speaking, writing, and graphics." The ASCE even goes so far as to stipulate that listening and other fundamentals of communication "should be acquired during formal education" (American Society of Civil Engineers., 2004, p. 135).*
- *The Accreditation Board for Engineering and Technology (ABET) requires that engineering programs ensure their graduates are able to "communicate effectively," which implicitly includes listening (ABET, 2004).*

How well have the required and non-required components of your engineering curriculum lived up to these engineering association ideals?

A recent survey of practices in communication programs at seven technical institutions found that listening was not emphasized in any of those programs (Leydens and Schneider, 2009). Generally, attempts to teach engineering students to listen are often located in senior design courses.

Exercise 35 *In many senior design courses, listening is conceptualized as hearing or paying attention to the customer or the client (i.e., as a basic skill). Think about how your experience in design courses compares with the results of one engineering education study, which reports that,*

> *skills in listening (incoming) and speaking (outgoing) are strongly linked, yet listening instruction and practice is scarcely to be found in the curriculum. Nowhere is this disconnect more clearly represented than in the Senior Design teams. Generally, everyone wants to present his [sic] point of view—and can do so forcefully—but has great difficulty in listening to and accepting the ideas of others. Communication falters among team members as a result (Wikoff et al., 2004).*

If listening is *important* for a twenty-first century engineer, it is *essential* for engineers involved in SCD contexts. This conclusion is evidenced by the four cases mentioned above—an overly eager but ultimately refocused Senior Design team, the team that engaged and listened to the Indian community to learn that the community actually desired a power-generating windmill, and the El Cajón Dam and brick making cases. One primary component of avoiding top-down SCD projects that fail to make culturally responsive inquiries into community perspectives involves the ability to listen *in* and *to* context, or contextual listening.

5.4 WHAT IS CONTEXTUAL LISTENING?

If listening is critical for engineers, what exactly is listening? In this section, we contrast two types of listening, basic and contextual listening. Basic listening is *necessary* in any human communicative interaction but is not *sufficient* for listening in SCD (and arguably, most other) contexts.

Key Term

Basic Listening refers to hearing or paying attention to the verbal and nonverbal messages of any speaker, such as a client, customer, local community member, coworker, or instructor. Basic listening is framed as a dyadic process of speaking (output) and hearing/receiving information (input). In this form of listening, relevant information is generally reduced to specific and quantifiable requirements such as cost, weight, technical specs, desirable functions, and timeline. Contextual and qualitative information, such as the history or political agenda of the person(s) making the requirements, is often devalued or ignored altogether.

A strong connection exists between listening to and engaging with local community members' perspectives and desires (or failing to do so) and the degree of ownership, success, and long-term sustainability of community development projects (e.g., see Salmen, L., 1987; Burkey, S., 1993; Slim and Thomson, 1995; Salmen and Kane, 2006). As we noted at the outset of this chapter, case studies point out the pitfalls of not listening to local perspectives or not acting on those understandings (see also Ogundimu, F., 1994; Starosta, W., 1994).

Key Term

Contextual Listening: A multidimensional, integrated understanding of the listening process wherein listening facilitates meaning making, enhances human potential, and helps foster community-supported change. In this form of listening, 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.

The absence of basic or contextual listening is satirized in Figure 5.3.

"We development experts have arrived,
and we know what you need:
one good piece of earth-moving equipment!"
© David Williams, used with permission.

Figure 5.3: Effective communication requires listening.

Below we describe several dimensions (both characteristics and desired outcomes) of contextual listening. These dimensions are interrelated, overlapping, and sometimes interdependent.

Exercise 36 *Search for visual representations of listening in engineering textbooks, websites, and other materials. To what extent do these representations align more with a basic or a contextual listening model? To what extent is your understanding of listening shaped by these models?*

Since each SCD project is unique, for each dimension, we have included salient questions in the Appendix that, if explored thoughtfully, can foster contextual listening across multiple contexts. Sometimes such questions are partially addressed through pre-travel research, other times via on site interviews and discussions, and frequently from spending time—and being with—people on site. Overall, the questions help us better focus on what issues in SCD projects are most crucial to listen for and to, and we recommend that SCD practitioners ask themselves these questions *throughout* their SCD projects.

Definitions of SCD center on "the importance of striking a balance between environmental concerns and development objectives while simultaneously enhancing local social relationships" (Bridger and Luloff, 1999, p. 381). The dimensions of contextual listening below provide some ideas for moving toward just such a balance.

Exercise 37 *Think of one time in your life when effective listening made a significant difference in a project, relationship, or situation. Also, think of a time when the absence of effective listening negatively affected the outcome of a project, relationship, or situation. From these two events, what can you learn about the dimensions of listening?*

5.5 DIMENSIONS OF CONTEXTUAL LISTENING

In past years, students and faculty in our ESCD course (described in Chapter 8) have asked three types of questions related to listening:

- In SCD contexts and especially while on-site, what are you listening for—to understand what, exactly?
- What are some of the characteristics of an effective [contextual] listener?
- What are the desired outcomes of [contextual] listening?

Collectively, the dimensions below are designed to address these three questions.

A. Integrating History and Culture

No SCD engineering project occurs in a vacuum. Instead, such work occurs in a community context, which itself is shaped by international, national, regional, and local socio-cultural/historical contexts. One can imagine these surrounding contexts as concentric circles, with the local community at the center, as in Figure 5.4. Such contexts materialize out of lived experiences and interpretations of such experiences and tend to vary significantly in the degree to which they influence local perceptions and identities. Knowing as much as possible about the history and socio-cultural realities of people in and around the community where your SCD project occurs is vital to project success—and is frequently overlooked. Since interpretations of history and culture vary based on one's perspective, it is important to both consult background readings and listen to how community members frame understandings of their own history, culture, and current perspective (for one method of doing so, see PDS at the end of this chapter).

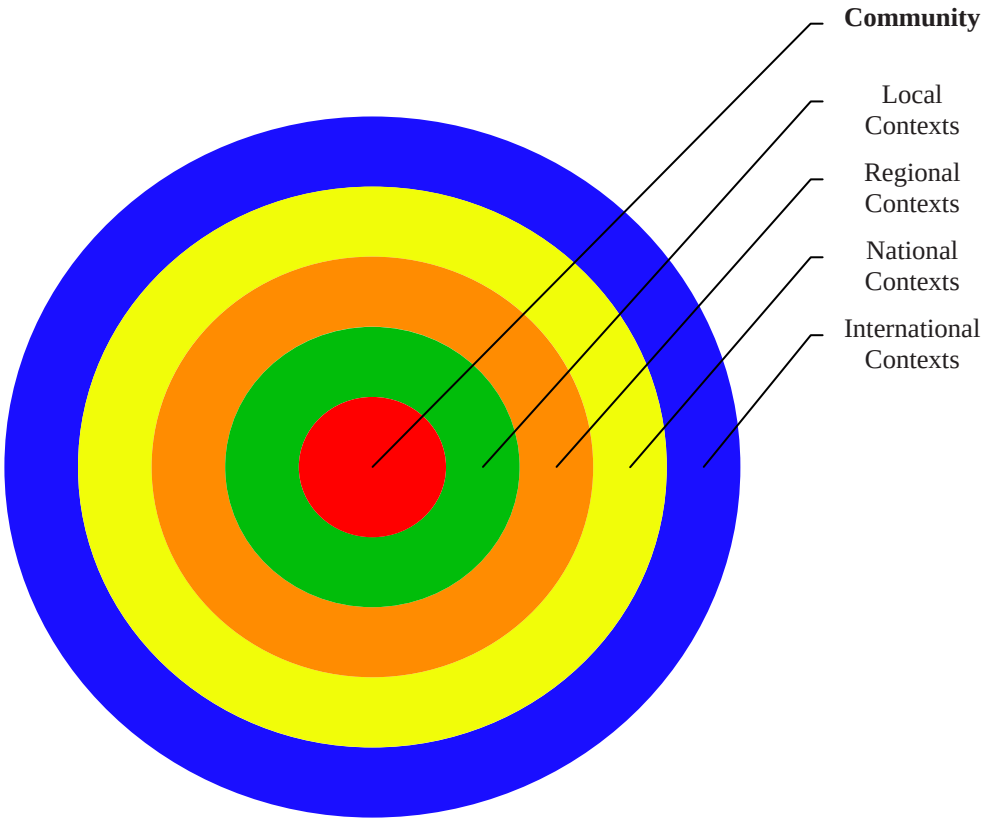

Figure 5.4: A simplified community-centric model of SCD.

Certain questions accentuate the importance of listening in and to context. Such questions are listed in full in the Appendix and a few appear after each dimension below, along with an opportunity to apply ideas regarding each dimension.

Questions for Integrating History and Culture

- What are the origins of the community that you are hoping to serve? What are the different ways to educate oneself to search and listen for these origins?

- What is the history of your relationship to the community? How did your project get to be there in the first place? Was it invited by the community? Was it proposed by your faculty or church?
- As you listen, how do community members indicate whether issues of gender, culture, nationality, social class, and race/ethnicity inform the community's diverse outlooks on itself, SCD, and outsiders?

Application

- How might asking the above questions have made a difference in the El Cajón dam and Peshawar brick making cases?

B. Being Open to Cultural Difference and Ambiguity

Acquiring traits of an effective listener is a worthy ideal. However, even with those traits, one may still be unable to achieve effective listening. Listening is more than traits; it is also an attitude or state of being that involves openness to the kind of ambiguity borne of cultural contrasts. The questions below encourage reflection on such a state, largely achieved through self-reflection and experience.

Questions on Being Open to Cultural Difference and Ambiguity

- What are your strengths and limitations as a listener?
- How can you constantly reassess your own degree of openness to perspectives that differ from your own?
- How tolerant are you about ambiguity, i.e., about not seeing some aspects of the world in absolutes, as either right or wrong?
- How do you deal with cultural difference? When a student from another country highlights differences between his or her culture and yours (in food, customs, values, etc.), do you try to make those *differences* into *similarities*? Or do you accept the differences as they are, even at the cost of some discomfort and ambiguity?

Application

- In the El Cajón case, to what extent was the dismissal by World Bank technocrats of the concerns by local engineers an act of intolerance to differences in technical assessment?
- In the Peshawar brick making case, to what extent was the reluctance by Chinese engineers to more thoroughly explore local brick making practices an unwillingness to understand and perhaps value local knowledge and cultural differences?

C. Building Relationships

In contextual listening, an emphasis exists on forming effective interpersonal relationships built on trust. Such relationships enable people to work successfully toward mutual goals. For instance, participant researchers of an educational intervention in post-tsunami Banda Aceh, Indonesia, note their interest in

> understanding listening as a practice that extends beyond simply hearing words. Our use of **listening** suggests that [SCD workers] attend to individuals, the classroom as a group, the broader social contexts, and to silence and acts of silencing.... Listening is fundamentally about being in relationship to another and through this relationship supporting change or transformation (Schultz and Smulyan, 2007, p. 100).

Gustavo Esteva, a community organizer and intellectual in Oaxaca, Mexico, underscores another way to think of building relationships that enable transformation. In 2008, when he spoke with well-intentioned students in our ESCD course, he said, "Don't come here [to Oaxaca] to help! Come here to listen, to find out if *our* struggles are *your* struggles. Then and only then, we can sit and discuss how, if at all, we can work together." A clear understanding of shared struggles takes time—and trust—before it emerges. In fact, as the questions in the Appendix suggest, significant obstacles can exist to identifying shared struggles.

As a relational and transformation-oriented act, contextual listening changes *you* and *your* relationship with community. You begin to change because, even if briefly, you begin to see the issue at hand as the community sees it. From this new perspective, you can rearticulate what you have heard back to the community. When you do, community members can now see that you have truly listened and perhaps have come to understand their struggles, even if your struggles are different. If the community confirms that your understandings are accurate, they will be more likely to begin to trust you and your relationship with them will be transformed. You may have reached a dynamic consensus that can be applied in partnership with the community. Such listening is crucial because if local community members see no tangible benefits to sharing their perspectives, they may stop talking or simply tell you what you want to hear; they may mistrust you. Their actual perspectives are then lost, perhaps while also losing an empowered sense of self-determination, which will certainly affect the success of any SCD project (Slim and Thomson, 1995).

Questions on Building Relationships

- How do you develop and maintain trust, the glue of effective relationships?
- How willing are you to change (e.g., become more empathic) to build more trusting relationships with others?

- How comfortable are you establishing positive personal and working relationships with people from other cultures?

Application

- In the El Cajón case and Peshawar brick making cases, how could have the World Bank technocrats or the Chinese engineers established trust with the communities that they were supposed to serve? What do such actions have to do with listening?

D. Minimizing Deficiencies and Recognizing Capacities

When we listen, incoming words and ideas are filtered through our own frames of reference. Two large frames are contrasted here, the *deficit* and *capacity* models. SCD projects operating under a deficit model conceptualize the local community members primarily in terms of what they lack, which can mask the community's capacities. By contrast, the capacity model acknowledges constraints but remains focused on the human, technical, cultural, and other capabilities available to achieve community-driven objectives. In this model, all participants remain open to discovering new or previously unrecognized capabilities that facilitate project success. Contextual listening in SCD contexts requires us to shift our focus from what communities lack to also include what they have. By recognizing a community's history and culture, valuing cultural differences, and building trusting relationships with them, you will begin to see more and more value in the resources that the community has to offer, especially non-financial assets like resourcefulness, techniques for doing things, different forms of organizing and managing time, resources and labor, and insights on how to work *with* nature.

Questions on Minimizing Deficiencies and Recognizing Capacities

- What kinds of listening reflect a deficit model? What kinds reflect a capacity model?
- Might living in a consumer-driven economy, where most comforts are taken for granted and often become "necessities," lead us to see some developing communities as lacking?
- Might our emphasis on valuing assets exclusively in financial terms (How much will it cost? How much will it return?) lead us to undervalue non-financial assets?
- If non-local SCD practitioners genuinely seek to enter the cultural frames of reference of local community members, what local knowledge, practices, and resources emerge as capacities?

Application

- Reflect on how these two models can make your own learning experiences very different. When professors teach from the deficiency model, none of what you bring to the classroom counts. Your previous experiences with the subject, your family history, your informal knowledge—all these things are considered irrelevant. Under the deficiency model, students are viewed as empty vessels to be filled by the expert knowledge of the professor and/or textbook.
- Meanwhile, how is teaching and learning different when professors teach from the capacity model?

E. Foregrounding Self-Determination

Community self-determination can be compromised or enhanced by various forms of listening. **Self-determination** suggests that the local community has a significant hand in determining its own destiny, free from undue external pressures. If the project truly *comes from* and is led *by and for* the community with the *invited* assistance of others, it has a better chance of fostering local self-determination. Clearly, this requires a different kind of listening. Through contextual listening, you will be able to understand how and by whom in the community a project can be initiated and led, and, perhaps more importantly, when and how you are being invited to participate.

Key Term

Self-Determination: The ability to play a significant role in determining one's own destiny, free from undue or excessive external pressures.

A Māori ceremonial gathering called a *hui* illustrates the principle of self-determination (Bishop, R., 2005). To cover the costs of running the *hui,* ceremony participants make contributions, traditionally, in the form of food, but today more commonly in the form of money. Pivotal to this act of giving in the ceremony is that the gift

> is placed in a position, such as laying it on the ground between the two groups coming together, so as to be able to be considered by the hosts. It is not often given into the hands of the hosts…[and] the process of 'laying down' is a very powerful recognition of the right of others to self-determination, that is, to choose whether to pick it up or not (Bishop, R., 2005, p. 122).

Key Term

Ownership: The significance or meaning attached to community members' sense that they own a given project—that is, that *they* are largely driving a project toward *their* objectives via decision making and action, with *invited* assistance.

Self-determination includes several components, one of which we describe here: ownership throughout the project. **Ownership** refers to the sense of who owns the project, from start to finish. If the community contributes significantly to defining and articulating their understanding of the problem and to brainstorming possible solutions, they have initial ownership. Ownership also comes from the community controlling or having significant input into major project decisions. If the community completes the project thinking that they did most of the work themselves and that their input shaped consensus-building processes and project outcomes, they have likely had project ownership throughout the process. In such a circumstance, the local community is more likely to assume responsibility for maintaining and/or upgrading project-related technologies—which is essential for the project to be *sustainable*. Generally, once project ownership is transferred outside local control, self-determination begins to deteriorate, in *any* phase of the project.

The absence of contextual listening can jeopardize self-determination in several ways. For instance, local community members who do not see their perspectives heard and incorporated into the various project phases (problem definition and solution, implementation, etc.) are more likely to lose a sense of project ownership. Can you think of other ways?

Questions for Foregrounding Self-Determination

- How can you "lay down" your potential contributions to an SCD project without forcing the local community to take them?
- What forms of listening detract from or contribute to self-determination and ownership?

Application

- As a student, how free do you feel to suggest to a professor an alternative assignment that might meet course goals as well as your own learning goals? Typically, commonplace in an independent study, such a suggestion may be less appropriate in core courses but more so in upper-division courses.
- Have you or anyone you know ever made such a suggestion? If so, with what result? If not, what factors may socialize students to not make such suggestions? How does such socialization affect how people listen in situations involving authorities or experts?

- How is listening to people in *any* community connected to promoting community self-determination?

F. Achieving Shared Accountability: How the "ours" vs. "theirs" Becomes OURS

As the previous discussion implies, the sharing of knowledge should not be unidirectional (from non-local to local SCD practitioner) but bi- or multi-directional (see also Ramaswami et al., 2007). Through listening and other means, each group should be learning from each other. This dialogic nature of knowledge exchange fosters power-sharing and shared accountability. That is, if all stakeholders engage meaningfully with the project, they will all feel accountable for their actions and for project outcomes—as the project ideally is a shared mission.

If accountability shifts entirely to the local community, non-local SCD practitioners may risk reifying the history of development, which is fraught with failed development projects wherein development workers had no extrinsic incentives to ensure long-term project success. They leave assuming that someone else will take care of the project. And if accountability rests entirely with the non-local SCD practitioners, the local community has likely checked out of the project—robbing it of the chance to solidify its sense of self-determination, augment its capacities, ensure ownership, and reap long-term project benefits. Herein lies an important paradox of listening in SCD contexts: at the same time one needs to listen so as to place emphasis on *community* self-determination and *local* ownership and benefits, accountability for project outcomes needs to be negotiated and shared by *all* project participants. Exploring and understanding the nuances of this paradox should help team members listen and communicate more effectively. We hope you will strive to know when the project is best located in *their* hands and when it should be placed in *ours*.

Questions for Achieving Shared Accountability

- Who is accountable for the project's success?
- How does this accountability shift over time?

Application

- As a student, who is accountable for the success of your courses? To what degree have you come to accept responsibility for the outcome of a course? What responsibilities are unique to professors, to students, and which are shared?
- What listening and other communicative actions and practices have fostered shared accountability so far in your SCD project? What future actions and practices might you consider?

Two other dimensions of contextual listening, bias awareness and multiple perspective integration, are explained later in this chapter, and questions pertaining to these dimensions appear in the Appendix.

Collectively, the dimensions above and associated questions are designed to help us establish a critical reflexivity with listening, the ability to reflect on how one's listening interfaces with one's status, actions and decisions throughout the project. As you may have noticed, underlying each dimension is a way of conceptualizing people that is designed to collapse and transcend the dichotomy between "insiders" and "outsiders" (i.e., between local and non-local SCD practitioners). As an ideal, we should be aiming to see each other as collaborators with a shared mission, "people to whom we are bonded through ties of reciprocity" (Narayan, K., 1993, p. 672). Sometimes called a "participatory mode of consciousness" this ideal "is characterized by an absence of the need to separate, distance and to insert pre-determined thought patterns, methods and formulas between self and other" (Heshusius, L., 1996, p. 627). Contextual listening aims toward this worthy but difficult-to-achieve ideal.

Exercise 38

- *If you are currently involved in a SCD-related project, notice how your teammates, faculty members, and others describe the local community. In what ways do their descriptions depict community members? As collaborators with a shared mission? As separate, strange, or alien? As different yet still connected "through ties of reciprocity?"*
- *In the next few weeks, notice how your classmates, faculty members, and others listen to each other. What kind of listening might they be enacting? What could they do differently to move towards contextual listening? What could you do differently?*
- *What factors in an engineers' education might diminish and/or enhance the perceived need to listen to community perspectives in SCD contexts?*

5.6 BARRIERS TO CONTEXTUAL LISTENING

If listening to community member perspectives is crucial to SCD project success, what barriers exist to putting contextual listening into action? Below, we discuss two specific barriers created by the engineering curriculum, drawing from a study that elaborated on these barriers (Leydens and Lucena, 2009). The first curricular barrier is the dominance of closed-ended engineering problem solving (EPS), and the second involves the quality and marginality of open-ended engineering design experiences.

5.6.1 ENGINEERING PROBLEM SOLVING

Engineering curricula rely heavily on math-based quantitative problem solving. But does such problem solving facilitate certain habits of mind, ways of knowing, and methods of inquiry while unintentionally marginalizing others? Some engineering students interviewed in our study suggest

that this is a distinct possibility (Leydens and Lucena, 2009). In the ESCD seminar (discussed fully in Chapter 8), students discussed how EPS intersects with one's ability to meaningfully engage with a community. EPS is the dominant six-step engineering method (Given, Find, Diagram, Make Assumptions, Equations, Solve) at the core of engineering curricula and reinforced and valued in engineering textbook problems and exams found especially in engineering science courses (e.g., Hagen, K., 2008). Despite years of engineering education reform, students are still largely graded, rewarded and penalized relative to their mastery of the EPS method (Downey and Lucena, 2006).

In a study interview, Michelle, a junior in chemical engineering, indicated that regularly practicing quantitative problem solving shaped her ways of thinking. She said that EPS "gets drilled into you, [through] the process of repetitive problem solving." Similarly, Jake, a senior in mechanical engineering, also indicated that EPS informs the way he solves problems, in and even outside of engineering contexts. Jonathan, a graduate student in engineering systems, confirmed Michelle's assessment during an ESCD class when he admitted that his job as a statics teaching assistant was "to drill the [EPS] method into [undergraduates'] heads." During an ESCD classroom exercise, engineering students calculated that during their undergraduate years they solve anywhere between 2,000 to 3,000 problems using EPS, depending on their major.

Related research suggests that students' ability to listen, understand, and value perspectives other than their own might be hampered by the preponderance of EPS in the curriculum (Downey and Lucena, 2006). EPS includes no explicit mechanism for listening, other than the initial step of listening to a problem statement in order to figure out the relevant information needed to solve the problem. The history, culture, and identity of the person stating the problem have no relevance. EPS also explicitly creates a boundary between the "technical" and "non-technical" dimensions of a problem, reinforcing the myth that the world of problems can be divided as such and marginalizing "nontechnical" dimensions as less important or irrelevant. In EPS, contextual listening is one such marginalized dimension.

We do not question the need for EPS in the engineering curriculum. However, EPS' *preponderance* in engineering curricula sends the message to engineering students that engineers can draw artificial boundaries around problems. That message can squelch other perspectives, stakeholder voices, and issues that could completely redefine and re-conceptualize the problem at hand—and thus the solution (Downey and Lucena, 2006). In fact, when students encounter open-ended problems in design courses, they often devalue design methods because those do not conform to how students have come to see engineering—that is, as EPS, learned in engineering sciences courses (Downey and Lucena, 2003).

Exercise 39

- *When solving problems in your engineering science courses, how often are you encouraged to*
  - *consider the history and culture of the people behind the problem?*
  - *develop listening traits? develop a listening state of being?*
  - *build interpersonal relationships to establish trust?*
- *How do your responses to the above questions shift if focused on problem solving that is closed-ended (generally one answer) vs. open-ended (multiple viable answers)? How does your response differ if the context is not engineering science courses but internship or cooperative experiences you may have had?*

5.6.2 ENGINEERING DESIGN

Yet if students are to learn any kind of listening in their engineering curriculum, it is most likely to occur not within engineering science but within design courses, which typically feature open-ended problems. Research on listening in engineering design contexts stresses active, participatory listening (Reid and Reed, 2005). However, the design experiences some students in our study recounted suggest that certain qualities in design instruction may also inhibit—or at least not foster—listening abilities (Leydens and Lucena, 2009).

For instance, Lisa, a senior in mechanical engineering, would have preferred the social impacts to be meaningfully integrated throughout her year-long Senior Design course, rather than being worth only about 5% of the course grade and tacked on at the end as an afterthought. Better integration, she said, would have helped her listen to and account for community perspectives throughout.

Jonathan suggested that his Senior Design experience was more about "listening to the spec" (an important skill in any design task) than about contextual listening to clients, teammates, or other stakeholders. By "listening to the spec," Jonathan learned to listen to design specifications (mostly in the form of numerical parameters such as cost) but not to the humans who may have conceptualized or interpreted those specifications differently. The above and other evidence suggests that EPS and some design courses may actually serve as barriers to learning and valuing contextual listening (Leydens and Lucena, 2009).

Exercise 40

- *Given what you have read so far in this chapter and in light of your own experience, what factors in your own engineering education have diminished or enhanced the perceived need to listen to community perspectives in SCD contexts?*
- *Which dimensions of contextual listening have been addressed by your design courses?*
- *What recommendations, if any, might you make for curricular reform to enhance students' contextual listening?*