Anthropology & Aging
Journal of the Association for Anthropology & Gerontology

Design for Aging

Perspectives on Technology, Older Adults, and Educating Engineers

Caitrin Lynch
Olin College of Engineering
Contact: caitrin.lynch@olin.edu

Excerpt in lieu of abstract

Does the development of new technologies invariably contribute positively to the daily lives of older adults in the contemporary United States and elsewhere? Eleven years into teaching anthropology to engineers, and five years into co-teaching a course on design for aging called "Engineering for Humanity," my answer is: Not always, but we can make it so.

Keywords: *design, technology, older adults, education, ethnography.*

Anthropology & Aging, Vol 36, No 2 (2015), pp. 127-134
ISSN 2374-2267 (online) DOI 10.5195/aa.2015.108

This work is licensed under a Creative Commons Attribution 4.0 United States License.

This journal is published by the University Library System of the University of Pittsburgh as part of its D-Scribe Digital Publishing Program, and is cosponsored by the University of Pittsburgh Press.

Design for Aging

Perspectives on Technology, Older Adults, and Educating Engineers

Caitrin Lynch
Olin College of Engineering

Does the development of new technologies invariably contribute positively to the daily lives of older adults in the contemporary United States and elsewhere? Eleven years into teaching anthropology to engineers, and five years into co-teaching a course on design for aging called "Engineering for Humanity," my answer is: Not always, but we can make it so. My colleagues and I have had numerous conversations about how engineering can contribute to human flourishing, and these dialogues have solidified our conviction that we must train our students to understand that empathy and context are essential for effective innovative design. The following notes toward a point of view on design for aging emerged from my work and discussions at Olin College of Engineering, and especially from collaborations with Ela Ben-Ur, Mel Chua, Sara Hendren, and Lynn Andrea Stein. Here I want to describe what we have learned about empathy in design practice, and how the pedagogical approach in the Engineering for Humanity class helps students develop technological innovations that contribute positively to the lives of older adults.

Why Empathetic Design?

In order to get students out of their own shoes, challenge their assumptions, and help them be attentive to values, meanings, and aspirations of those they are designing for, we teach our engineering students how to use anthropological methods for understanding people. Following Bronislaw Malinowski's now-famous description of the how and why of ethnography, we aim to train our students to "grasp the native's point of view, his relation to life, and to realize his vision of his world" (1922:25, emphasis and pronoun use in original).

Unexamined assumptions held by designers and engineers can lead to inappropriate technology, overdesign, or the right solution to the wrong problem. For example, consider the following story from my colleague Mel Chua, who is deaf. For her nineteenth birthday, Mel's engineering college roommates built a direction-signaling box for her car, so they, as passengers, could tell her where to turn. They mounted buttons to activate lights that would blink to tell Mel to turn left or right, go straight, stop, etc. Mel and her friends were excited to get out and test the system… until they got in the car and realized that hand signals worked more effectively. Hand signals utilized peripheral vision, could communicate a wider range of turn options, and required no batteries. The artifact ended up spurring a discussion of how to redesign communications protocols in Mel's car, but the ultimate solution ended up being to not use a device at all.

Vol 36, No 2 (2015) ISSN 2374-2267 (online) DOI 10.5195/ aa.2015.108 http://anthro-age.pitt.edu

In terms of innovations regarding aging in particular, let me provide a positive example of mobilizing empathy to accurately frame the problem, and ultimately to generate better solutions. (I borrow this example from the writer and surgeon Atul Gawande [2014a].) Dr. Bill Thomas has led a movement for rethinking institutional elder care in the United States. When Thomas worked at a nursing home in the early 1990s, unhappy, unengaged, agitated, and depressed patients were treated with medication because the problem was assumed to be with the patients themselves. Thomas arrived and reframed the problem. Attributing the same behaviors to "the Three Plagues of nursing home existence" (boredom, loneliness, and helplessness), the design problem or opportunity shifted to addressing those plagues, not the person.

So Thomas brought animals, plants, and children to the nursing home to "bring in some life." Thomas described the impact to Gawande:

> People who we had believed weren't able to speak started speaking…. People who had been completely withdrawn and nonambulatory started coming to the nurses' station and saying, "I'll take the dog for a walk." All the parakeets were adopted and named by the residents. The lights turned back on in people's eyes. (Gawande 2014a: n.p.)

And, Gawande adds, Thomas's team found that the use of medication, such as psychotropic drugs for agitation, dramatically decreased (Gawande 2014a; cf. 2014b).

Several years ago I had the following Facebook exchange with an engineer named Steve.[1] Ever since I have used this exchange in classes to generate discussion about this very phenomenon of reframing the problem. Steve invokes Amazon Fresh, a service in which a customer receives home-delivered groceries by placing orders online:

> Caitrin: …I have 2 students working on a project this semester about making the grocery shopping experience easier for older adults. Please let me know if you know anyone willing to have students accompany them on a shopping trip to observe/discuss. Thanks.
>
> Steve: Amazon Fresh. http://fresh.amazon.com/
>
> Caitrin: Might that high-tech solution inadvertently remove some of the pleasures of shopping for older adults (such as socializing, dressing up, getting out of the house, feeling in control, seeing friends, making choices on the fly in response to things s/he sees, pinching cute babies on the cheek, etc. etc.)?
>
> Steve: Nope. Worth noting that I don't see it necessarily as a tech solution to that problem. It frees you up to engage in alternative baby-pinching socializing controlling friendly activities that don't have a sense of suck.

I use this exchange to prompt students to understand the context and meaning of activities for people they are designing for. What would ordering groceries online for home delivery enable and disable for older adults? How might a design solution solve some problems but ignore or create other problems?

I invite students to consider what shopping in a store might enable for older adults, beyond the instrumental purpose of acquiring food for sustenance. I do not suggest that tech solutions are always inappropriate for these same grocery shoppers who might want to get into the store to exercise choice, enact independence, and be social. I prompt my students to consider how we might redesign aspects of the experience to enable people to shop even as some abilities might decline. In addition to improved product design, consider these possible systems-level solutions, some already available in select elder-friendly grocery stores: attractive benches strategically placed for resting; magnifying glasses hanging from shelves for reading labels; store staff trained to be sensitive to confusion that may result when items are relocated to new spots in the store; bargain pricing for other than "family size" servings.

But I also caution students that just because the solution for some older adults may not be Amazon Fresh, for some people, safety, comfort, and engagement at home might be more desirable. I share with students a discussion I had more recently with Greg, a designer at a personal emergency response system (PERS) company. This is a system that centers on a button worn as jewelry. A press of the button in an emergency triggers a call center worker to summon the required help. These systems can be an important aid for many older adults who want to age in place and independently.

Greg was proud of a project he had led to design a box that could be shipped to a customer with the entire system inside; the customer could set up the system without the need for a visit from an installer. When I first heard of his work, I categorized it with the Amazon Fresh example: a naïve engineer ignorant of the loneliness felt by some older adults, removing the human interaction just to save on labor costs. But then Greg described to me why he and his team did this work and I realized it was I who was naïve.

After months of interviewing older adults, Greg accumulated numerous examples of how the interview and feedback process itself was problematic for the customers. So worried that he would arrive when she was in the bathroom, one woman didn't eat for the 24 hours before Greg came. So anxious about a stranger's impending arrival, one man forgot to take medicine that morning and Greg had to get medical help for him. With these observations and insights, Greg focused on how to prevent these disruptions in daily self-care routines. He designed the box, the instructions, and the devices to be usable by people who not only might have vision loss and limited dexterity or cognitive capacity, but also might be intimidated by new technological systems. He focused on the mastery experiences that an 80-year-old new customer might feel after independently doing all the work to activate the system.

In this installation box example, we find an engineer deeply attuned to the people he was designing for. Rather than narrowly focused on a product, he considered the wider context for the product in a person's life. We hope to train our engineers to be so empathetic and appreciative of context. One opportunity comes through the Engineering for Humanity course I co-teach at Olin College.

As my colleague Sara Hendren has noted, the what and the how of engineering have long been emphasized in traditional curricula. But adding the questions who, when and why invites students of engineering to a much bigger, fundamentally human set of questions. Why do we build what we build? Why this choice and not another? Who is asking for a new product or system? When might we invert or alter the traditional questions, to get better answers?[2] With these humanistic questions in turn, let's turn to the Engineering for Humanity course.

Engineering for Humanity

Growing out of a commitment to introducing students to interdisciplinary opportunities to make a difference in the lives of older adults, Lynn Andrea Stein and I created Engineering for Humanity, which we first offered in 2011.[3] Lynn and I found complementary perspectives and expertise in Lynn's background in engineering, design, computer science, and cognitive science and mine in anthropology and aging. Engineering for Humanity, which earns the students credits in both anthropology and engineering, engages older adults in the local community. The course is an elective for students from three colleges, Olin College of Engineering, Babson College (a business college) and Wellesley College (a women's liberal arts college). The majority of students are Olin engineering students in the second semester of their first year; cross-registered students from a wide range of majors at Wellesley, undergraduate and MBA students from Babson, and foreign exchange students have also participated in the class. We recruit older adults from the surrounding communities to participate in a series of design and community-building activities. Students also do contextual work to understand broader issues about aging in the United States and elsewhere. Students focus in on working with one person (or domestic partners) and then identify a problem or opportunity, find an appropriate and acceptable solution, and build that solution within the space of one semester. This is a complete start-to-finish process of learning to design for a single user (design-for-one).

Past student projects have included the following (among others): a gardening stool for a woman who cannot kneel due to knee surgeries; a cutting board to enable cooking for a woman with macular degeneration and glaucoma; a laundry-carrying bag for negotiating steep New England basement stairs; domestic organizers for keeping track of frequently lost items and grocery needs; videos and other aids for using and learning English for recent immigrants; foot massagers to relieve diabetes-related foot neuropathy and prevent sleep disruptions for both members of a household, only one of whom has neuropathy. To attract new students into design for aging, we presume no engineering or design background. To expose students to an entire design and build process (from identifying values, opportunities, and problems, to building solutions), we anticipate projects modest in scope and relatively low tech. This pedagogical approach to early student exposure and design-for-one also has helped us to develop a point of view on effective design for aging.

Designing for one and in the low-tech space allows students to develop close relationships with community members, to make an immediate and meaningful difference in someone's life, and to understand how engineers can contribute to needs and opportunities around aging. Students come to reframe engineering as not only the technically complex, high-tech work they hear about in theoretical lecture classes. Instead, they learn from experience that elegantly simple solutions to everyday problems can have transformative impact on people and address more than they might have anticipated in their initial framing.[4]

Allow me to describe a few such transformations. At the final event for the class in 2014, students gave podium-style presentations followed by science-fair style hands-on demonstrations. I watched one student, toward the end of her team's PowerPoint presentation, look directly at her community partner and, in front of the roughly 100 college and community members assembled, thank her for working with the team. She said, in essence, "You are kind,

smart, fun, interesting, a great cook, and we learned so much from you. We will miss working with you." I observed another student introduce his parents to his 90-year-old community partner. The elder woman gave the student's mother an embrace from her wheelchair height and lauded the son as her "angel." The next day I received an effusive phone call from another community partner, who experienced a teary goodbye when he had left the event, to tell me that his team deserved an A+. And then I read my students' reflection papers, and came across comments such as this, in response to a prompt on how (if at all) has the class changed student understandings about aging:

> This course changed my relationship with aging. Getting to know senior citizens was the most meaningful for me and influenced my perceptions the most. It has changed my perception of my grandpa. I used to associate aging with failing health and inability to do things. Growing up, my grandpa would go on hikes and go camping with my dad and me. As he got older, he stopped hiking. I attributed it to his body failing. I thought it was too difficult for him to do physical activities. This made me dread aging because I want to be able to do the things I love when I'm older, and my grandpa used to love hiking. Taking this class made me realize that he didn't stop doing what he loved, but rather adapted to his limitations. He started canoeing more when he began hiking less. He enjoys being outdoors and is still able to experience that.

What I like in this response is how the student has been able to reframe his own life. The class has led to self-reflection and a newfound respect for and understanding of his grandfather. The student also has come to new ways of thinking about needs and values as he reframes canoeing and hiking as similar in what they both enable, rather than an earlier interpretation that canoeing was an abandonment of hiking.

Another year, I was heartened to read this in a student's final refection paper:

> Any good design is secondary to what's really important—rebuilding the broken bridges between the elderly and the rest of society. We can make the elderly more independent and therefore gain more liberties, but we must also change the attitude of the non-elderly to create a complete community.

I am struck by this student's articulation of where the design opportunity is. It is not just in aiding an individual. We have a responsibility to make positive differences in the community at large, which will then have a positive impact on individuals.

Our teams do strong work each year, some of which results in a product the community partner takes away to use at home. But even when it does not, the class has generated among students more sophisticated understandings about experiences of aging and changed definitions of design. The product designed by students is not of central importance in this class. For the students, what really matters is the reframing of what engineering is and how it is done, as well as exposure to the world of design opportunity around aging. The older adults greatly value their interactions with young students and we have found positive impacts in terms of decreased isolation, increased meaning and purpose, and improved feelings of wellbeing (Lynch et al. 2014). In a *Boston Globe* article about the class, one community partner described the co-design process with students regarding her experience carrying items while using a walker:

> These kids are the top of the top. They have very willingly and openly wanted me to contribute to the project, and it's been a joy to get the [brain] cells going again…. It's changed my whole outlook. Before, I thought whatever you're given is what you have to use. Now I think, let's see what else we can do. I feel so much richer for the program. It gives us seniors not only the chance to have a voice, but have it be listened to. (Cantrell 2013, n.p.)

Positive Practices in Design for Aging

Elsewhere in this volume, my colleague Maruta Vitols and I refer to IDEO designer José Colucci's principles for design for aging: Respect the Individual; Ease the Transition; Do Not Help More Than Is Required; Promote Empathy; Encourage Fresh Thinking; Promote Connection.[5] These principles urge designers to be sensitive to the range of ways of aging rather than assume a universality of experiences, to avoid over-designing or over-interpreting the role of the designer, and to think beyond the obvious.

With these principles in mind, I can certainly further admire the PERS box solution, and I can frame the ways in which Amazon Fresh might work for some people, but not for the reason imagined by Steve, the engineer who wrote that technology in this case "frees you up to engage in alternative baby-pinching socializing controlling friendly activities that don't have a sense of suck." Very few older adults who I know in the United States are able to organize their time to find activities that are intentionally baby-pinching, socializing, controlling, and friendly. Instead, many older adults look forward to doing an instrumental activity such as acquiring food because it also gives them a chance to talk to people, observe children and young parents, find new products on the shelves, make choices about purchases based on sales and what looks good, and engage in a routine activity such as taking money out of a wallet and exchanging it for something of value. All this contributes to a feeling of still being part of society for people who often feel marginalized and invisible.

In the space of design for aging, but also accessibility more generally, my Olin colleagues and I hope to lead students to understand the importance of accounting for context to make a positive difference in people's lives. We expose students to examples of technologies and systems that presume very different questions of the design opportunity.

Here I would like to provide an example from my colleague Sara Hendren, who teaches a course on assistive and adaptive design. In the course, "Investigating Normal," Sara invites her students to think about design approaches to deafness. Cochlear implants are a high-tech, precise, and refined engineering solution to grant hearing to people who cannot hear. But Sara also shows her students the architectural innovations at Gallaudet University, an all-Deaf campus in Washington, D.C.. Gallaudet provides what is referred to as Deaf Space: a built environment that is engineered to accommodate deafness. Many classrooms at educational institutions have walls that separate spaces and make visual communication localized. But in a campus center example that Sara provides, sight lines of the room extend its whole length, making it possible to communicate in the visuality of sign language across distances. There are no walls to interrupt the vision of people well across the room.

As Sara notes, it is possible to be interested in both of these solutions to deafness. But cochlear implants proceed fundamentally from a logic of technology as cure, whereas Deaf Space

is a technology of accommodation. These are forking paths at some point, and an interesting conundrum for young engineers and designers when thinking about how to make things for people with atypical bodies and minds.[6]

At an engineering conference in Spain in 2015, Sara, Lynn, Mel and I led a workshop on the politics and practices of assistive and adaptive design.[7] As we described there, these two points of view are known as the medical model and the social model of disability, respectively. The medical model focuses on the disabled individual. It labels disabled people as broken and in need of fixing, usually through drugs or surgery, medicine, or technology. It also labels them as "other"—not one of "us," but one of "them." As anthropologists well know, this process of othering sends a message about who rightly belongs, and who does not. In the medical model, the message can come across that the problem belongs to the disabled person, so the fix has to be applied to the disabled person, as in a cochlear implant, or psychotropic drugs in a nursing home.

But with Deaf Space at Gallaudet, and Dr. Bill Thomas's parakeets, we see the social model of disability. With the social model, the problem of disability belongs to society, and so the fix has to be applied to society and by society. The social model recognizes that members of society define what "normal" is, and who is inside or outside that boundary. The social model includes a perspective that people are disabled by the interactions and environments that we design—as formal designers but also as participants in society.

We decide as members of a society what our design constraints will be, and what assumptions we will make about people who participate in the world we create. Some aging examples: How high are our tables in a coffee shop and how does that work for people who use a wheelchair? How low to the ground do we stock items in a grocery store? Do you need both hands to open a jug of milk? Does a timer on a stove emit a beep that cannot be heard by many older adults? Do we have ample job opportunities for people who might prefer part-time work? At Olin College we train our students to examine their assumptions and understand the context of the lives they hope to impact. Our world would be even better if we can all become designers who notice and act on the barriers to flourishing that exist all around us.

Acknowledgments

Thanks to Mel Chua, Sara Hendren, Lynn Stein, and Jason Danely for their collegiality and for comments on earlier drafts of this essay. The Engineering for Humanity course has been funded by a grant from the MetroWest Health Foundation.

Notes

1. Steve is a pseudonym, as is the name Greg in the second example below.
2. For more on Sara Hendren's articulation of these questions, see https://vimeo.com/channels/eyeo2015/134764010
3. I taught the course with Lynn Andrea Stein for the first two years and with Ela Ben-Ur for the next three.
4. Pullin 2009: 83-85, on simplicity and accessibility.

5. As presented in the Engineering for Humanity class at Olin College, February 2015. Quoted with permission.
6. For more on Sara Hendren's articulation of these questions, see https://vimeo.com/channels/eyeo2015/134764010. See also the concept of Deaf Gain (as opposed to "hearing loss") in Bauman and Murray 2014.
7. Lynch et al. 2015.

References

Bauman, H-Dirksen L. and Joseph J. Murray, eds.

2014 Deaf Gain: Raising the Stakes for Human Diversity. Minneapolis: University of Minnesota Press.

Cantrell, Cindy

2013 "Olin Program Combines Engineering, Humanity." Boston Globe, 24 March.

Gawande, Atul

2014a "Can Life in a Nursing Home Be Made Uplifting and Purposeful?" The Telegraph, 4 October.

2014b Being Mortal: Medicine and What Matters in the End. New York: Metropolitan Books.

Lynch, Caitrin, Lynn Andrea Stein, Sharon Grimshaw, Elizabeth Doyle, Lois Camberg, and Ela Ben-Ur

2014 "The Impacts of Service Learning on Students and Community Members: Lessons from Design Projects for Older Adults." Paper presented at Frontiers in Education Conference [FIE], Madrid. 24 October.

Lynch, Caitrin, Sara Hendren, Mel Chua and Lynn Andrea Stein

2015 "Designing for Atypical Bodies and Minds: Politics and Practices." Workshop run at joint conference, Mondragon Spain: 13th Active Learning in Engineering Education Workshop (ALE); International Symposium on Project Approaches in Engineering Education (PAEE); 5th International Research Symposium on PBL (IRSPBL). 6 July.

Malinowski, Bronislaw

1922 Argonauts of the Western Pacific: An Account of Native Enterprise and Adventure in the Archipelagoes of Melanesian New Guinea. London: Routledge and Kegan Paul.

Pullin, Graham

2009 Design Meets Disability. Cambridge: MIT Press.