Chapter 10. Human-Centered Design Guidelines

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College and university space is for people?for learning, meeting, exploring, thinking, or relaxing. Campus spaces, particularly classrooms, influence our attitudes about education. We all have memories?good and bad?about such campus places. Although too little thought has typically gone into the significance of space in the learning process, we have an opportunity to change that by adopting human-centered design. Human-centered guidelines begin by considering the needs of students and educators, making it possible for space to support the transformation of learning.

Human-centered guidelines aren't just a tool for architects or designers. Faculty want teaching and work environments to support?not hinder?their work. Human-centered guidelines can help. Administrators trying to bring to life a vision of the campus as an engaging place for learning and teaching can use human-centered guidelines. Architects and designers play an important role in helping clients formulate and realize their visions for changing the status quo and realizing the potential of place; they, too, can use human-centered guidelines. No matter your position, if you influence the design of learning spaces, human-centered guidelines can help make you a catalyst for enriching learning.

Guidelines are not just another word for design standards. Current design standards begin with the premise that learning happens in a limited set of ways, thus a finite set of space configurations support them. This industrial, instruction-focused approach arose from the necessity of accommodating large groups of students at the lowest cost.

Human-centered design guidelines build on the premise that learning happens in many ways and that the design possibilities supporting learning are equally numerous. Despite multiple design possibilities, however, there is just one desired outcome: to enrich learning and teaching. As a result, human-centered guidelines are predicated on universal human needs and learning principles.

Human-centered design concerns process as much as results. Traditional processes are often linear, meaning that with funding approved, the learning space development gets turned over to an architectural and design firm and/or facilities team, with little continued representation from educators.

Collaboration?an effective learning style?should be considered an effective design tool. A collaborative and committed team can create a stimulating process and produce innovative results. The best learning space designs come from diverse project teams committed to transforming learning and composed of people who challenge and strengthen each other's ideas. Because design is an iterative process, the design team should stay involved throughout the project.

These human-centered guidelines arose from my professional experience and collaborations with a number of colleges and universities. You can use these guidelines

- to clarify the important enablers of learning and teaching;
- as a common language to help your team articulate its criteria for success; or
- to direct decisions when constraints arise.

Foundations of the Guidelines

People are at the center of learning, so their needs should be at the heart of a human-centered design process. These beliefs formed the foundation of the guidelines.

The First Priority: Basic Human Needs

Humans seek both physical and psychological comfort. Judith Heerwagen talked about a person's sense of well-being and how it influences productivity, creativity, and engagement. Her research has focused on four elements that must coexist to create positive and productive places: cognitive effectiveness, social support, emotional functioning, and physical function.[1]

If people aren't comfortable and don't have a sense of well-being, they become distracted. We must first consider what will make people feel comfortable, freeing their brains and bodies for learning.

Diverse Learning and Teaching Styles

Diversity abounds; individuals learn in different ways. Bob Barr and Jon Tagg recognized this when they wrote, "Our mission is not instruction but rather that of producing learning with every student by whatever means work best."[2] Each brain is uniquely organized, so space should offer variety, both for faculty and for learners. Space should be fluid so that it can accommodate different learning and teaching styles effortlessly.

Guiding Principles

The 12 brain/mind learning principles articulated by Renatta Caine help us understand how humans function and learn. A few of these principles suggest direct connections among stimulation, learning, and physical space.[3]

- **The brain/mind is social.** We change in response to engagement with others. Space has a role in determining the quantity and quality of engagement as well as its potential as an effective learning experience.
- **Learning involves both focused attention and peripheral perception.** Good space design is visually stimulating. While space should not distract from the ability to focus, it can provide sensory stimulation that influences the experience and thus learning. Space can also be the "silent curriculum"[4] that complements and increases engagement.
- **Each brain is uniquely organized.** We all perceive the world in different ways and act accordingly. People do not experience an environment in the same way. The best opportunity for success comes from variety.

Articulating these fundamentals can keep design ideas and processes focused on the most important characteristics of a human-centered learning environment.

Characteristics of Human-Centered Guidelines

These guidelines, although more than a checklist, are not prescriptive. They invite an exploration of learning environments for their capacity to transform learning. While the guidelines can apply to large-scale construction projects or single-classroom renovations, this chapter primarily focuses on the places where teacher/student exchange happens, typically the classroom. Classrooms are a core element of the campus, yet their potential is often overlooked.

Regardless of the unique functional requirements of your project, these guidelines can help direct discussions with anyone involved, whether associated with the institution or a design firm. When used to set direction, these ideas facilitate purposeful choices without adding cost.

This approach is holistic. Although I address each characteristic individually here, it is their interplay that creates human-centered learning spaces.

Healthful

Healthful spaces incorporate ergonomic and environmental principles and sustain physical well-being.

- **Lighting.** Tuning the mood and stimulation levels of students can be achieved through a mixture of lighting types, including natural light, augmented with controls. Typically, indirect lighting is the best dominant lighting source in learning areas. A variety of lighting is the most important way to maximize the effect on learning; it can be achieved with different types of lighting or with dimmers.

  Quantifiable data does not exist on the impact of daylight on productivity; however, we do know that it has psychological impact, such as reducing stress and elevating mood.[5] The Heschong Mahone Group 1999 study of more than 2,000 classrooms concluded that students in classrooms with daylight improved 20 percent faster in math scores and 26 percent in reading scores over one year compared to students in classrooms without daylight.[6] The follow-up study confirmed favorable benefits for teachers as well.[7]

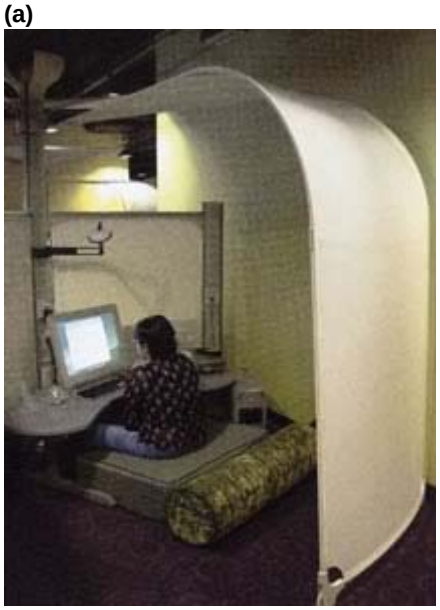
- **Ergonomic considerations.** Ergonomics is about more than a comfortable, adjustable chair. Ergonomic thinking considers the entire environment and how it supports and interacts with the human body. Well-planned pathways, open access to equipment and supplies, and ease of moving furniture are all ergonomic considerations.

  Because of the diversity of human sizes, tables and chairs should be adjustable. Instructors and students should feel encouraged to get up and move around. Two principles of sound ergonomic thinking are worth remembering: it shouldn't hurt, and it should prevent injury. At Emory University's Cox Hall, the comfort of individuals is supported through a choice of seating options, from pillows on the floor to adjustable task seating

(see chapter 8). (See Figure 1.)

Figure 1. Cox Hall at Emory University Provides (a) Pillow Chairs and (b) Movable Chairs

(a)



(b)

Stimulating

Stimulating spaces attract people and spark creative thinking. They have the ability to motivate and engage students and educators.

- **Sensory cues.** Multisensory experiences engage and stimulate people. Visual, tactile, auditory, and kinesthetic experiences all influence memory and the intake of information.[8] Diverse stimulation raises mental awareness and allows people to absorb the information and ideas that the environment facilitates.[9] Very little of our learning experience or the design of learning environments considers this. Yet certain learning experiences can be tied to a particular place, sound, or smell, which provide cues that help the brain build memory and process information. Humans associate what they learn with where they learned it. The key here is that spaces must have variety to stimulate, sometimes accomplished simply by painting rooms different colors.
- **Elements of surprise.** Mystery and surprise stimulate the human mind and senses and invite discovery. Consider the potential of hallways and pathways that provide unexpected spaces for group work, casual conversations, or hiding away for quiet work. According to Herman Miller research, "New ideas often emerge during social interactions. Relaxed, informal, and friendly interactions help creative people share openly with others and spark new connections."[10] Consider areas that support chance encounters or lingering after a class. The space design should include opportunities for serendipity and unplanned activities.[11]
- **Transparency, visual access.** Connecting visually lets people feel a part of something bigger. To see others engaged in learning can energize learners. Consider adjacent areas and how you can connect formal and informal learning spaces, such as classrooms and lobbies. Corridors, too, become part of the learning experience when they invite activity and have interesting views, as opposed to long, stark, and linear places. Vistas into and out of learning spaces need not cause distraction, instead enhancing cognitive activities. Students and faculty spend much of the day indoors, so providing architectural and design elements that expand and open interior views and provide lines of sight proves engaging.[12] As an example, see Figure 2, which shows the Auburn Career Center. Glass walls visually connect informal learning in the open spaces to the structured activities happening beyond the translucent surfaces. The ceiling changes color throughout the day, mimicking the movement of the sky.

Figure 2. Glass Walls at Auburn Career Center

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- **Connection to nature.** Nature continually stimulates us because of its always changing elements. The human response is positive, though typically subconscious. Environments that simulate nature provide a sense of security and pleasure.[13] Features found in a natural habitat can be associated with a created environment. Consider, for example, reflective surfaces or glass associated with water. Fire, the provider of warmth, food, and light, can be replicated in dining areas?the types of places where people instinctively gather. Varied ceiling heights can represent the safety and comfort of a tree canopy. Meandering halls or pathways mimic nature's patterns. This connection to nature is represented in a Learning Studios space at Estrella Mountain Community College (see chapter 19). See Figure 3.

Figure 3. Learning Studio at Estrella Mountain Community College

- **Color and texture.** Textures, colors, and shapes can reinforce association and retention. The key is to think of the total environment, considering ways to achieve interest and variety. Let the timeless and stimulating colors and textures of nature guide the human-made applications you apply.[14]
- **Diverse shapes.** Create spaces that offer visual choices of shape and form. A rectangular box is not the only answer; subtle adjustments to the geometry of space can balance hard and soft forms, asymmetrical and symmetrical patterns, creating visual and tactile interest. Consider the influence of geometry on the activities within the classroom. A circle, for example, suggests collaboration and communication, much like a campfire did for early generations.[15] Consider the visual interest possible with architectural shapes and patterns. Off-grid walls and a mixture of curves and corners give life to the Learning Teaching Center at the University of Dayton in Ohio (see chapters 3 and 4). See Figure 4.

Figure 4. Learning Teaching Center, University of Dayton

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Balancing Community and Solitude

Learning spaces need to balance the dual and opposite human needs for community and solitude. Because learning happens both in quiet, private moments and in lively, social settings, environments need to offer a spectrum of private and interactive places.

- **Social, community space.** Learning is a social activity. Community and social space connects individuals with other people and other activities. Students and faculty participate in a mutual endeavor?learning?and forge connections that reinforce learning and create a sense of belonging.
- **Opportunities and spaces for socialization.** Use classrooms during unscheduled hours for group projects, for example, or target halls and lobbies for informal meeting areas. Provide places to join the community of students. (See Figure 5 for an example of an informal learning area that supports collaborative and individual work with a mixture of relaxed settings.)

Figure 5. Spaces for Socialization

- **Refuges, private spaces.** It is important to create individual, private spaces. These don't have to be compartmentalized?even turning a chair can signal a desire for privacy. A Herman Miller, Inc., research report on patterns of creative work discussed the importance of spaces for quiet, focused thinking: "The quiet moment allows one to finally have a chance to sort out the stimuli and make the connection click."[16] In creating opportunities and spaces for private, thinking time, consider ways to modulate the level of privacy, such as seated-height panels, rolling screens, and plants. This conceptual approach provides private spaces in a variety of degrees of enclosure, shapes, and forms.

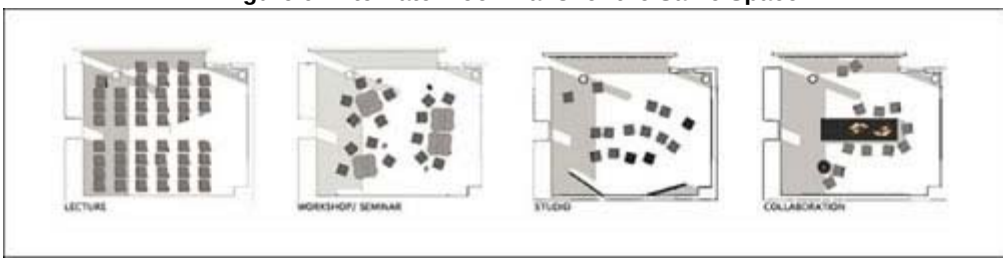
Adaptable

Adaptable spaces support people, activities, and change. Learning spaces need to keep pace with a variety of learning and teaching styles.

- **Flexibility.** Areas within a space should flex for various types of learning and teaching. Plan the ways in which you

can take a single area and transform it from a lecture space to a small group space to a large-group discussion space. (See Figure 6.)

Figure 6. Alternate Floor Plans for the Same Space



Click image for a larger view

- **Adequate space.** Movement of people and furniture to different learning settings requires adequate space. Current space allocations for classrooms discourage movement and circulation areas deter people from lingering and interacting. If the space allocation doesn't support movement, then diversity in teaching and learning methods will be impossible.
- **Welcoming and familiar.** Humans have a tendency to seek out familiar places or create places with familiar attributes. Think about the ways you arrange your home. You create the place, the condition, the situation?you arrange furniture and artifacts in a certain way to suit your purpose or preference. Similarly, learning environments should allow students and educators to personalize them. The space should look comfortable in a variety of arrangements and for a variety of people.
- **User ownership.** Consider the ways a space can "give" permission for ownership?and not just to faculty. Users must know that all occupants have a say in defining the place. Educating users about how to use the space to its fullest potential and how the various tools and furnishings can support occupants' needs is a prerequisite. Providing furniture that people can rearrange and tools they can manipulate gives them the feeling that they have permission to claim ownership.
- **Changeable focal points.** Why establish a fixed front of the room? Without a set orientation, the room's occupants can move and group furnishings, technology, and activity in multiple ways and in many places within a space. Lecture and presentation areas need not be restricted to the front of the room.
- **Mobile displays.** Consider how you move flipcharts or computer displays throughout a space, to wherever students and faculty need the tools. For example, a small group may develop information and then reconnect with a larger group to share their work. Tools need to accommodate mobility of people and of information. Design that assumes all information exists in the faculty's PowerPoint slides or overheads limits learning opportunities. The Media Space Classroom project, for example, was developed to address changes in design education at Harvard's Graduate School of Design due to the increasing popularity of digital design methods. This space (see Figure 7) supports remote collaboration, teaching with digital media, and digital design presentations while anticipating future needs.

Figure 7. Media Space Classroom

- **Diverse information communication.** Display information in various ways?on the chalkboard, whiteboard, or digitally. Consider how the tools that deliver information can be shared and controlled. Control can rest with the lecturer or with the class during an active dialogue. Well-designed space and technology allow the pace and style of information delivery to change and support multiple learning/teaching styles and people. Maximizing the amount and type of display was a key goal for Estrella Mountain Community College's Learning Studios prototypes (see Figure 8).

Figure 8. Estrella Mountain Community College Learning Studios (a) Maximize Display and (b) Support Small Group Work

- **Technology tools.** Technology (projectors, personal computers, and so on) will change more quickly than other elements in the furnished environment. Technology should be integrated into the space to fluidly support learning, but recognize that it will not match the lifespan of the room. Technology tools should support human interaction; they should not become the centerpiece of the space.
- **Power/data access.** Mobility of students, faculty, and technology is a given. As a result, you should make power and data access as mobile as possible. Anticipate the locations where users will want access and the range of activity needing support.

Conclusion

We will know we have succeeded in human-centered design when spaces support learning and create a positive experience. Like technology changes, physical space changes are only as good as the learning they enable. The true test of learning transformation will be measured by the National Survey of Student Engagement (NSSE) and other tools. The NSSE looks for improvements in areas such as active and collaborative learning, student and faculty interaction, and support for learners.[17] All these dimensions are affected by the interior space. Colleges and universities already seeing results from new learning environments include the 20 institutions of the Documenting Effective Educational Practice (DEEP) program. One of the success factors discovered by DEEP is that institutions "adapt environments for educational advantage" and "create engaging spaces for learning."[18]

Human-centered guidelines will help institutions create space that can transform learning. Remember that every decision you make or influence regarding interior spaces will affect the experience of the people learning and teaching in that space. Become a catalyst for change. Imagine how much richer and more effective learning will be when the physical environment is developed as a powerful learning tool.

Endnotes

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About the Author

Lori Gee leads Herman Miller's Education Solutions Team and the company's focus on learning trends and higher education environments. This work guides the company's overall development of unique solutions for learning environments. As a design practitioner with 20 years of experience in using space as a strategic tool, she has helped many organizations and institutions set meaningfully different directions for improved results. Her work is a whole-systems approach to planning and creating learning spaces, considering the relationships of all aspects of space.

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