

National Center for Women & Information Technology

PROMISING PRACTICES

How Does the Physical Environment Affect Women's Entry and Persistence in Computing?

The design of physical spaces communicates beliefs about what kinds of people belong in them and what kinds of activities should be done in them (Hattenauer, 1984). Imagine if doctors' offices were designed like dry cleaning shops: no room or furniture for sitting, clear view of what goes on behind the desks, and open glass front windows. Patients would not expect to wait long for their appointments nor could they reasonably expect privacy during a consultation. The medical profession would be, for better or worse, revolutionized.

Many of us have experienced being in a place where we felt like we did not belong, a place designed for someone not like us. For example, you might have been a staunch rock and roll fan in a country-western bar, with wagon wheels, mounted moose heads, and cow hides on the walls. Most people prefer to avoid or leave environments where they feel like they don't belong — even if they can't explain what makes them feel uncomfortable — and that reaction helps explain women's absence or departure from computing.

FEELING LIKE YOU BELONG

Much of the research on career choice focuses on "fit" between a person and an occupational environment. For example, leading scholars on this topic argue that fit in an occupation depends on having personality characteristics similar to the people already in that occupation. The jury is still out on many aspects of this theory, but estimating person-environment fit — deciding whether I belong here — is clearly an important element of career choice. For this reason, efforts to attract a broader population to computing must avoid communicating stereotypes that lead women or other underrepresented groups to feel they would not fit comfortably in a computing major or occupation.

Commonly held beliefs about gender, technology, and the relationship between the two shape the context for participation in computing. These beliefs stereotype computing as masculine, which influences thoughts and expectations about the type of person suited for computing study and work. Often operating at a subconscious level, these stereotypes affect feelings of belonging in computing environments.

Stereotypes are communicated in a variety of ways, including cues in the physical or virtual environment. For example, rooms decorated with images and objects associated with "geeky" stereotypes are less appealing and welcoming to women than are gender neutral rooms. Likewise, online classrooms decorated with these stereotyped images lead women to feel that this environment is not for them. Research has shown that this effect of stereotyped environments **measurably reduces women's interest in declaring a computing major and their anticipated success in computing.**

The physical environment is one of several factors that contribute to the gender gap in computing. Together with other commonplace practices and situations, it helps to create a climate where women feel more or less comfortable. Understanding this influence allows us to actively craft a more gender-balanced field.

CREATE A WELCOMING ENVIRONMENT

Create a physical environment that communicates a sense of belonging to a broad population. According to research done with college students, items such as stacked soda cans, Star Trek and Star Wars images and paraphernalia, video game boxes, comics, science fiction books, electronics, and computer parts communicate a lower sense of belonging to women than men. Objects such as these create a comfortable environment for only a narrow portion of the population. To instead welcome a wider range of people into computing, create a more gender neutral ambiance with items including plants, art or nature posters, water and a coffee maker, or general interest books and magazines.

RESOURCES

Cheryan, S., Plaut, V., Davies, P., & Steele, C. (2009). Ambient belonging: How stereotypical cues impact gender participation in computer science. *Journal of Personality and Social Psychology*, 97(6), 1045-1060. Also see video presentations of Dr. Cheryan's work at <http://www.uwv.org/programs/displayevent.aspx?rID=33000> and <http://www.uwv.org/programs/displayevent.aspx?rID=33001>

Hattenauer, D. (1984). The rhetoric of architecture: A semiotic approach. *Communication Quarterly*, 32, 71-77.

Satterwhite, R., Fleenor, J., Braddy, P., Feldman, J., & Hoopes, L. (2009). A case of homogeneity of personality at the occupational level. *International Journal of Selection and Assessment*, 17(2), 154-164.

NCWIT offers practices for increasing and benefiting from gender diversity in IT at the K-12, undergraduate, graduate, and career levels.

Visit www.ncwit.org/practices to find out more.

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PROMISING PRACTICES

Design Physical Space that Has Broad Appeal (Case Study 1)

Affecting Women's Entry and Persistence in Computing through Physical Space



K-12 Education



Undergraduate



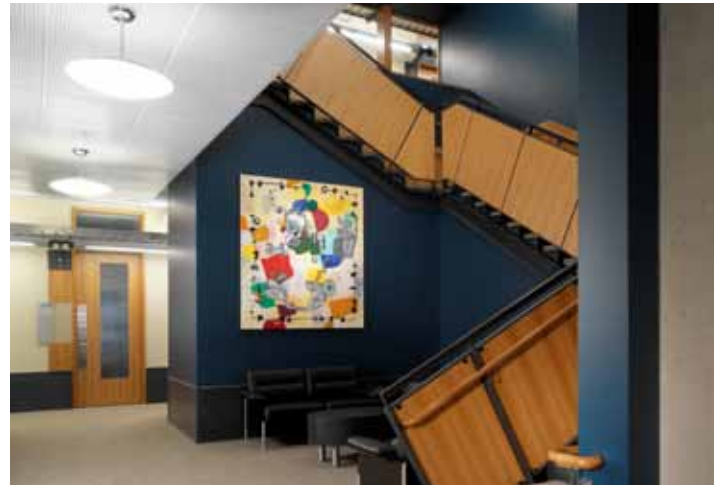
Graduate



Career

Hank Levy, Chair of the University of Washington's Department of Computer Science & Engineering, described the design of a new building that applied principles supported by research on stereotypes and the environment. The new building is one of many actions the department takes for promoting diversity.

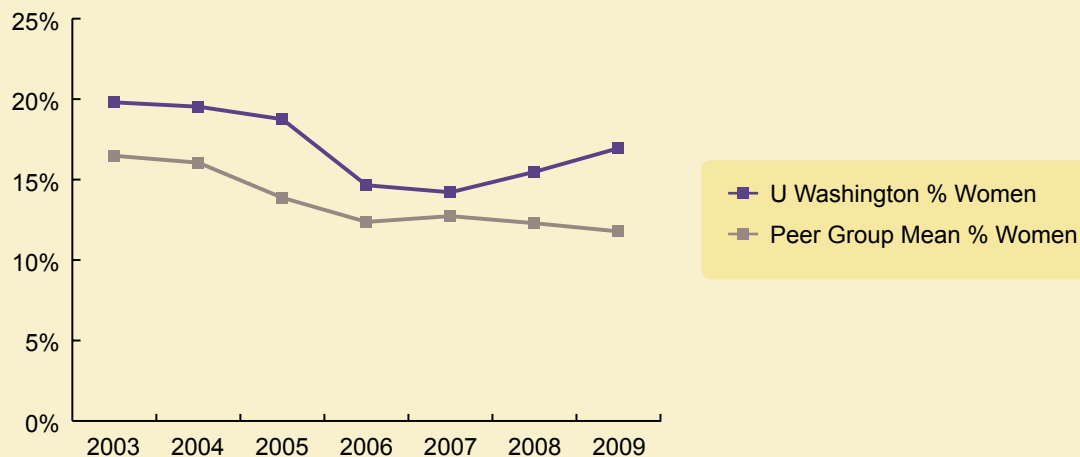
The Paul G. Allen Center for Computer Science & Engineering at the University of Washington opened in 2003. Among its major goals, the building was intended to be warm, welcoming, and "non-techy" in appearance. All spaces are carpeted to give it a soft feel, and the extensive use of cherry wood trim adds warmth. Unlike most academic buildings, there are no conference or technical posters lining the hallways. Instead, occupants and visitors see a collection of original paintings, prints, and photographs from 22 university-affiliated artists whenever they enter or leave a floor in the building. This artwork is the only wall covering in the building. Computer labs in the basement have colorful walls adorned with large nature photographs. Overall, the goal was to make the Allen Center a people-oriented building that surrounds users with softness, warmth, and a celebration of aesthetics.



Ed LaCasse Photograph of the Paul G. Allen Center for Computer Science & Engineering

Levy advised that we be aware of the message that our environment communicates and design it to convey a friendly and welcoming feel to *all* visitors. The graph below suggests that the new building may be accomplishing that goal at the University of Washington and, along with the department's other diversity initiatives, contributing to increases in women's representation at a time when peer institutions saw continued declines.

TRENDS IN WOMEN'S SHARE OF COMPUTING BACHELOR DEGREES



RESOURCES

Case Study Contributors: Hank Levy

NCWIT offers practices for increasing and benefiting from gender diversity in IT at the K-12, undergraduate, graduate, and career levels.

This case study describes a research-inspired practice that may need further evaluation. Try it, and let us know your results.

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