

# CONSIDERING CONTEXT

Kilgore, Atman, Yasuhara, Barker, Morozov, 2007

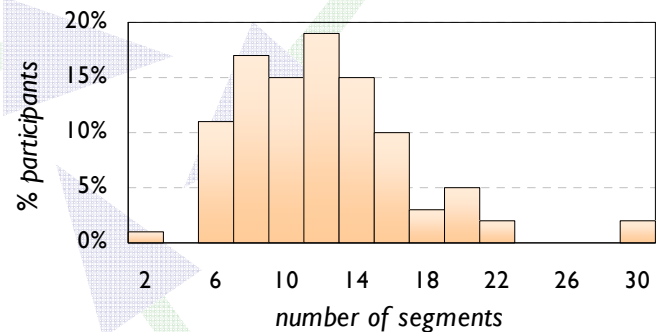
High-quality engineering design requires understanding how the resulting engineered artifact interacts with society, the natural environment, and other aspects of context. This study examines how first-year engineering undergraduates approached two engineering design tasks. We focused on how much students considered contextual factors during problem scoping, a critical part of the design process. As part of a larger, longitudinal study, we collected data from 160 students at four U.S. institutions. Students varied in their consideration of each design

task's context, and women's responses were more likely to be oriented toward broad context than men's. Broad-context orientation was positively correlated between the two design tasks, despite differences in data collection and analysis methods. Beginning engineering students in this sample, particularly women, were sensitive to important broad contextual factors. We suggest that efforts to broaden participation in engineering should consider legitimizing and fostering broad context-oriented approaches to engineering earlier in the curriculum.

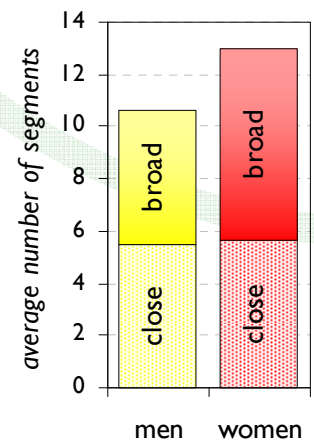
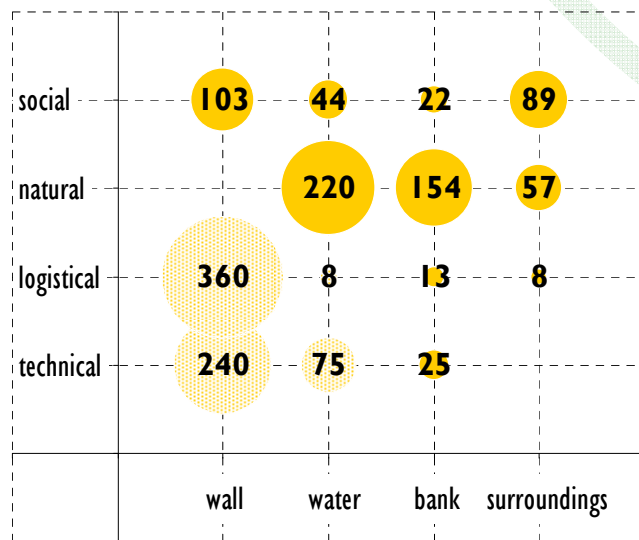
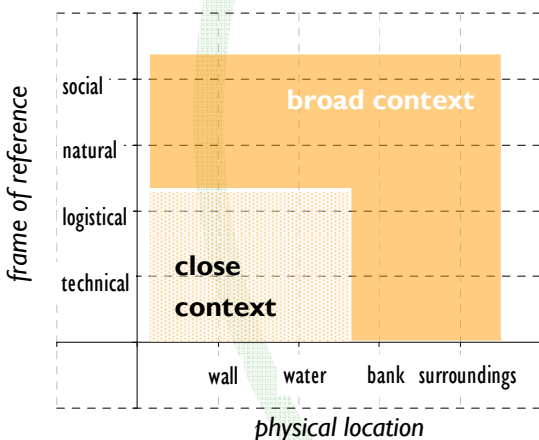
*Over the summer the Midwest experienced massive flooding of the Mississippi River. What factors would you take into account in designing a retaining wall system for the Mississippi?*

124 participants took up to 10 minutes to write their answers to the Midwest floods question. Transcribed responses were segmented into distinct "thought units," each expressing one discrete idea.

Average response length was about 11 segments, with distribution as shown.



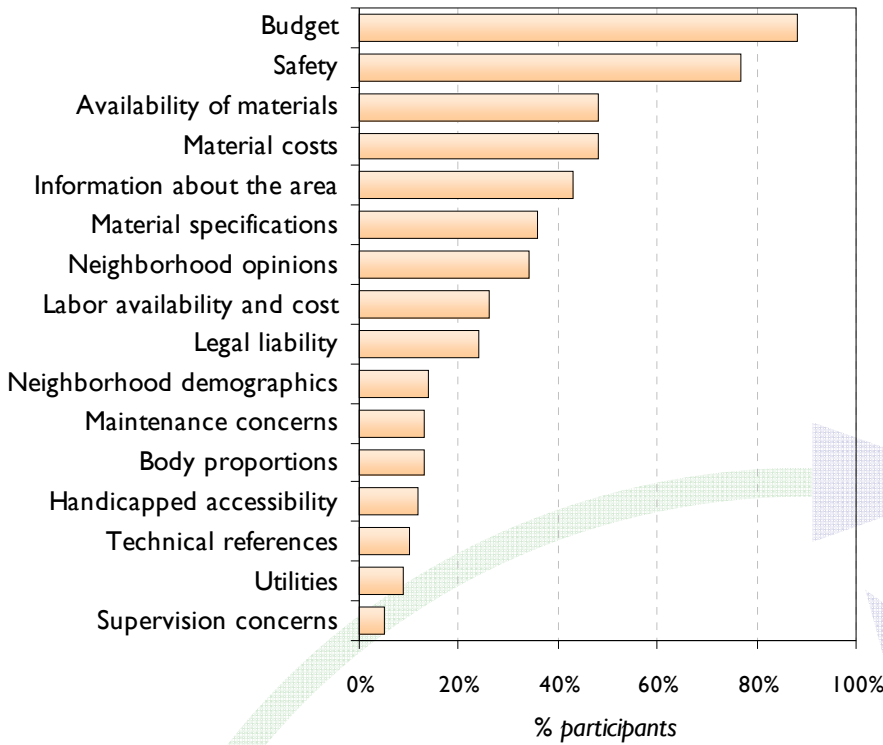
Each segment was coded in two dimensions, physical location and frame of reference, with four codes for each, as represented on the coding grid below.



All 124 participants' segments distributed across the coding space as shown. Disc area is proportional to the number of segments coded with the corresponding location-frame code pair.

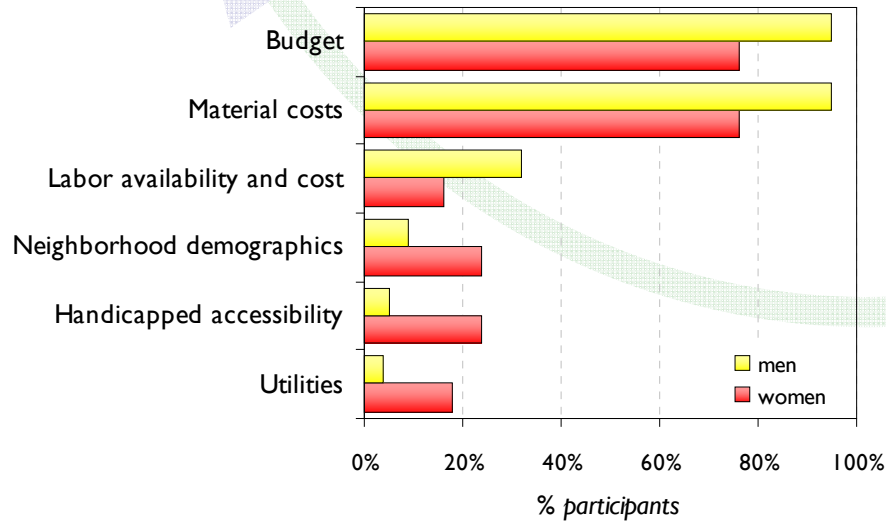
Women averaged more broad context segments than men ( $p < 0.01$ ).

143 participants responded to the playground information-gathering survey question with exactly five selections.



You have been asked to design a playground. You have a limited amount of time and resources to gather information for your design. From the following list, please put a check mark next to the FIVE kinds of information you would MOST LIKELY NEED as you work on your design...

Each bar shows the percentage of participants who included the corresponding kind of information as one of their five “most likely needed” selections.



Gender differences in selection frequency were significant ( $p < 0.05$ ) for six items.

## THE PICTURE FROM THE FIRST YEAR...

### Problem scoping

- Women: similar attention to close context, and greater attention to broad context
- Men: more emphasis on close context factors than on broad context factors

### Information gathering

- Women: more emphasis on broad context of solution, such as handicapped accessibility, neighborhood demographics, and information about the area
- Men: more emphasis on close context of solution, such as budget, materials, labor

contact: Deborah Kilgore <kilgored@u.washington.edu>, Cynthia J. Atman <atman@u.washington.edu>

Kilgore, D., Atman, C.J., Yasuhara, K., Barker, T., Morozov, A. (2007). Considering Context: A Study of First Year Engineering Students. *Journal of Engineering Education*, 96(4), 321–334.