# CS-480—Senior Seminar
# Synopsis: *Attraction to Computing*
# Fall '03

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## Primary Papers

Almstrum, Vicki L. "What is the Attraction to Computing?" *Communications of the ACM*, Vol. 46, No. 9, pp. 51–55, Sept. 2003.

Estrin, Thelma. "Women's Studies and Computer Science: Their Intersection." *Annals of the History of Computing*, Vol. 18, No. 3, pp. 43–46, 1996.

Johnson, Deborah G. and Miller, Keith W. "Is Diversity in Computing a Moral Matter?" *SIGCSE Bulletin*, Vol. 34, No. 2, pp. 9–10, 2002.

Lazowska, Ed. "Pale and Male: 19th Century Design in a 21st Century World." *SIGCSE Bulletin*, Vol. 34, No. 2, pp. 11–12, 2002.

Klawe, Maria. "Girls, Boys, and Computers." *SIGCSE Bulletin*, Vol. 34, No. 2, pp. 16–17, 2002.

## Additional Papers

Goyal, Amita. "Women in Computing: Historical Roles, the Perpetual Glass Ceiling, and Current Opportunities." *Annals of the History of Computing*, Vol. 18, No. 3, pp. 36–42, 1996.

Borg, Anita. "Computing 2002: Democracy, Education, and the Future." *SIGCSE Bulletin*, Vol. 34, No. 2, pp. 13–14, 2002.

Lee, John A. N. (JAN). "Well Behaved Women Rarely Make History!" *SIGCSE Bulletin*, Vol. 34, No. 2, pp. 14–15, 2002.

Prey, Jane and Treu, Kevin. "What Do You Say? Open Letters to Women Considering a Computer Science Major." *SIGCSE Bulletin*, Vol. 34, No. 2, pp. 18–20, 2002.

Pratt, Lorien and Misra, Manavendra. "Perspectives on Academic vs. Industry Environments for Women in Computer Science." *SIGCSE Bulletin*, Vol. 34, No. 2, pp. 20–22, 2002.

Taylor, Valerie E. "Women of Color in Computing." *SIGCSE Bulletin*, Vol. 34, No. 2, pp. 22–23, 2002.

Jones, Anita "The Curious Ways of Professional Cultures and the 'Two-body Opportunity'." *SIGCSE Bulletin*, Vol. 34, No. 2, pp. 24–25, 2002.

## Almstrum

Almstrum presents some interpretations of the results of a survey she conducted after realizing that there was very little actual data on why women leave Computer Science at increasing rates as the level of education increases. In addition to some demographics of the sample, she reports on two categories of response. The first category includes answers to questions having to do with the importance of Mathematics in Computer Science, the role of math phobia in blocking success in CS and perceptions of gender differences in degree of math phobia or competence. She seems to conclude that her respondents view math as important, believe math phobia is not an insurmountable barrier to success and do not perceive significant gender differences in these areas. Although this seems to contradict conventional wisdom, given that her sample is predominately female, older and successful in CS, it is, perhaps, not a surprising result. The second category of responses she reports have to do with factors which attracted the respondents to CS. Using primary component analysis of the responses, she clustered these factors into four dimensions that she feels characterize types of people in computing. She then suggests ways that we might enhance the CS curriculum to attract or retain each of these types of students.

In discussion, it was noted that if she is seeking to understand why women (or people in general) *leave* CS studies, Almstrum seems to be sampling the wrong population. One cannot draw conclusions about why one population is not successful in an endeavor from the things that have attracted a distinct, successful, population to that endeavor. It was also pointed out, by one of the class who is majoring in Sociology/Anthropology as well as CS, that, in current sociological practice, surveys are not generally regarded as good tools for this kind of question. Nonetheless, the clustering of factors into dimensions, with some exceptions, seemed reasonably natural. None of us felt that any one of the dimensions actually encompassed all the principle factors that drew us to computing, which is consistent with the interpretation of these as dimensions in a space of interests but not with them as characterizations of types of students. There were also a number of factors that seemed potentially significant that do not appear in the list, including, for instance, family history and interest in the underlying Electronics and Physics.

## Estrin

Thelma Estrin makes the argument that Women's Studies and, in particular, Feminist epistemology, have much to offer Computer Science. (She argues that CS has much to offer Women's Studies as well, but that is not the main thrust of her essay.) CS (and Science and Engineering, in general) have tended to emphasize an abstract analytical approach to knowledge to the detriment of those whose understanding tends to be more concrete and intuitively based. She suggests that women and minorities are more likely to fall into this latter category. Following Turkle and Papert (who are, in turn, following Levi-Strauss) she refers to this manner of understanding as *bricolage* contrasting it with "planner ideology", which she sees as the dominant approach to CS. She then argues that CS, at least, can be approached in a way that is consonant with this concrete/intuitive sensibility, describing Turkle and Papert's research into experiential pedagogy for CS and reiterating their plea for *epistemological pluralism*.

We were not so certain that *bricolage* is really an identifiable gender characteristic. Although it seemed plausible that the proportion of women who are more comfortable with this mode might be higher than the proportion of men who are, it did not seem to us that this was a characteristically feminine way of thinking. There was some concern about whether the *bricolage* approach is actually compatible with CS, which is, to a great degree, about analysis and abstraction. There was also question about whether in nurturing *bricoleurs* we might just be training hackers (as in "change things until it seems to work" debugging).

For at least some of us, though, there is a distinction between the style of thinking Estrin characterizes as abstract and analytical and the process of thinking about abstraction and analysis. Turkle and Papert claim that the type of "top-down" formal reasoning typical of planner ideology is a style of thought, not an end in itself. In their experience, and in some of our own, it is possible to grasp highly abstract notions in concrete, intuitive ways. Turkle relates the *bricoleur* to the painter, who works by a process of continual conversation with their product. While she views this as antithetical to the "structured programmer's planning aesthetic", in the realm of painting it is clearly not incompatible with either structure or analytic thought. There doesn't seem to be any reason why it should be any more incompatible with these in the realms of science. In any case, we seem to all agree on the desirability of epistemological pluralism.

## Others

We did not get to the other papers individually in the discussion. Most of these are short essays from the introduction to a special issue of the ACM Special Interest Group for Computer Science Education. Collectively they represent a broad statement by the people at the forefront of the effort to address the problem of broadening the demographics of the CS community.