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The growth of jobs in the IT sector over the next twenty years is widely documented as growing significantly, however the enrollment in Computing at many universities is dropping, ensuring that we are not educating the people we need to maintain our innovative edge. The education system, if done right, has the potential for attracting many new people to the Computing discipline, but the challenges are many. Challenges facing the approach to computing education include the context and way Computer Science is taught, the image of what "computing" is, the reward structure for faculty within the universities, and availability of funding for curriculum development.

Knowledge of technical skills is necessary, but not sufficient to succeed as a Computer Scientist in either industry or academia. Innovative insight is also required. Environments which support the development of skills in innovation include ones that are open, collaborative, multi-disciplinary, and global. Specific knowledge is not sufficient; the ability to think and solve open-ended problems and to learn and adapt is critical.

One of our programs at the Anita Borg Institute is the Virtual Development Center, a collaborative network of ten colleges and universities that draws technical and non-technical women, and their supporters, into technology by making the connection between technology creation and social impact. The reason why the VDC has been so successful with its participants is that "Design-based learning integrates four practices believed to increase participation of women – authentic learning context, collaborative assessment, knowledge sharing among students, and the humanizing of technology."[1] The goals of the VDC are 1) increase technical literacy and knowledge of those who have not had a voice, 2) empower women's impact on society, 3) develop technology more appropriate for women and society through student projects, and 4) transform the educational system.

In determining how to shape the future of this program, we face several challenges. We need to expand the reach and scope of the program. The program needs to become part of a larger educational reform.

A reward system needs to be set up in institutions for faculty that embraces curriculum change, innovative and new programs. Passionate committed faculties create and initially maintain these programs. But if these faculties are not supported by their institutions either because research rather than teaching is a higher priority or there is no systematic integration of these programs into the curriculum, the programs will not be sustainable.

Collaboration across multi-disciplines and multiple departments is important for students and for the discipline because it provides opportunities to learn between fields, and provides students a broader view of Computing. Furthermore, collaboration across multiple institutions in distributed environments is becoming increasingly important because of the complexity and global nature of the Computing field. Institutions will need to cooperate together on larger projects at geographically different locations and across multiple countries, enabling understanding of different cultural perspectives, priorities and approaches and leveraging particular institutional strengths and expertise.

[1] Jessup, E. R., Sumner, T., & Barker, L. J. (in press). Report from the trenches: Implementing curriculum to promote the participation of women in computer science. Journal of Women and Minorities in Science and Engineering.

Continued funding of innovative programs is an issue. 85% of federal funding is going to medical and biological sciences.[2] We are spending today on physical sciences what we spent in 1970. Increasing the focus and funding in computing and information technology is paramount.

In addition to academia, government, and professional societies, another stakeholder to consider is industry. "Recent significant changes in the high-tech industry sector are raising the level of collaboration between private companies and universities, bringing about a cultural shift in higher education."[3] The needs of industry and participation by industry in academic settings warrant further investigation.

[2] National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY2003.

[3] Klawe, M. & Whitney, T. University-Industry Partnerships with High Potential for Impact. Publications from the Forum for the Future of Higher Education (2003)