Lessons I've Learned in 22 Years of Working with Teachers About Girls in IT

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In the late 1970's and early 1980's, Sylvia Kramer was a gifted, visionary 5th grade teacher and the Title IX compliance officer for the Great Neck Public Schools on Long Island, New York. Great Neck was, and is, an upper-income community, and as such was one of the first school districts in the country to buy computers for its students. As a feminist, Sylvia noticed something other teachers didn't: nearly always it was the boys who took advantage of the opportunity to use the Commodore PET computers, the TRS-80 computers, and the Apple II computers. (Remember those? Remember how the 64K Apple IIe in 1983 was a marvel of progress?) When she became the executive director of Women's Action Alliance in New York, she immediately wrote a proposal about sex bias, as we called it then, in children's computer use to the Women's Educational Equity Act Program in what was then the Department of Health, Education and Welfare. They funded it. She started looking for someone to run it.

At the time Sylvia was still in Great Neck, I was directing my first nationwide project. It dealt with women in nontraditional occupations, also funded by DHEW, and it was clear to me that the future for women in predominantly male jobs lay in the technologies, not in the construction trades. When Sylvia interviewed me for her new WEEA project, computer equity for girls seemed to me quite similar to nontraditional occupations for women — just younger. She hired me in 1983 to direct the new Computer Equity Training Project, and I became the first person in the United States (and for all I know, the world) to direct a project concerned with girls and computers.

In the twenty-two intervening years, I've had occasion to do many more projects, most of them nationwide, dealing with girls, teachers, and computers — five projects on the topic specifically, and five others that included it as part of a broader focus on gender and math, science, and technology. I've worked with teachers from elementary school through postsecondary education, parents, administrators, and girls themselves.

History

When I started doing computer equity work in the early- to mid-80's, the typical reaction from teachers and administrators who had computers for student use was that there was no problem because there was no computer gender gap. In visiting schools, it quickly became apparent to me that educators simply didn't notice it. I remember touring a middle school in the Midwest with a principal who was proud to show me around his beautiful new building, built with clusters of two or three computers in various places. The first cluster we came to was unoccupied. The second had one boy. The third had two boys. The fourth had three boys. Finally, we saw a girl and two empty computers at a fifth cluster. The principal turned to me and said, "Well, I'll be damned. I had no idea!"

I came to expect the "Well, I'll be damned" realization. Unfortunately, it was usually followed by the observation that boys' preponderance of computer use didn't matter, because boys were "naturally" more interested in computers than girls. So we were back to "no problem."

By the early 1990's, things were somewhat different. By then, there had been some articles in the professional and public media, but teachers repeatedly assured me that in *their* schools things were different. "The girls here use computers a lot!" When I looked more closely, however, it turned out they were talking about girls in keyboarding classes, data entry classes or word processing classes — basically, computing for the Future Secretaries of America.

In the late 90's we got past clerical computing when educators triumphantly pointed to girls' use of multimedia on the computer and how girls were emailing like crazy. Girls were also enthusiastic about the Internet. In other words, the traditionally female interests of art and socializing enabled educators to claim the nonexistence of a computer gender gap. They didn't notice that the increasingly prevalent programming courses enrolled mostly boys. I remember once a well-intentioned teacher sincerely asked me why it was important that girls take programming. Good question, actually. I answered it by asking him about the value of taking programming in general. When he was able to answer my question, he answered his own.

The second half of the 90's was also the time I started to hear a new variation on the theme. By then, due perhaps to continuing articles in newspapers and the professional press as well as conference presentations, there was general recognition among educators that in fact, a computer gender gap was real, it mattered, and it was in their own schools. We computer equity specialists had finally succeeded, right? Wrong. Now what I heard was: "Well, you're right. There really is a computer gender gap and I see that it matters. But we have so many other initiatives going on this year that we have no time for anything else. Maybe we can get to computer equity next year." So computer equity took its place at the end of the line, far behind the need for a new roof and uniforms for the football team.

Now we're in a new decade, and honestly I find the main excuse of this decade even harder to deal with than the earlier ones. The story I'm hearing now from educators goes like this. "Gender equity in computing? What are you talking about? We solved all those gender equity problems in the 80's and 90's. Why do you feminists keep complaining about the same old thing?" A recent variation on that theme is heard perhaps even more often: "You feminists keep complaining about the same old thing, but OUR problem is the boys!" This means that to make any headway, I must first convince skeptical educators that there is *still* a problem despite real progress for girls and women in math and in some areas of science and technology. I also have to convince them that boys' undeniable educational problems don't negate those of girls.

Most educators don't seem to notice that the healthy presence of girls at lower levels of computing in schools masks imbalances at the upper levels. In 2003, for example, girls were only 10 percent of the students who took the more advanced computer science exam in high school for Advanced Placement college credit (College Entrance Examination Board, 2003). This is the lowest female representation in all 34 exams offered. In a national survey of over 275,000 college freshmen carried out in the fall of 2003, students were asked to rate themselves on a variety of skills and characteristics. The issue on which male and female students diverged most was computer skills: almost 25 percent more young men than young women rated themselves as above average (Young, 2004). Educators don't seem to make the distinction between using technology vs. creating it for the rest of us to use. They are not coming to grips, apparently, with the fact that IT is now the major gateway to technical careers, replacing math in that role a generation earlier, and that technical careers are more central in our economy and national life than ever before.

Where We Are Now

Almost 20 years ago, Eunice Okeke, a Nigerian science educator and gender equity specialist, taught me that the three requirements for gender equity progress were awareness, concern, and action — recognition of a gender imbalance, belief that the imbalance matters, and doing something to change it. The absence of any one of these prevents progress.

She was right, but based on what I've seen I would say it differently now. To achieve gender equity in IT (or in any sphere for any underrepresented group), one must have
- Knowledge
- Resources
- Resolve

In other words, one must know about the problem, have the resources to address it, and be determined to do so.

I propose this way of looking at the IT gender gap because it highlights a different situation now. First, by 2005, we have a great deal of *knowledge*. There have been several decades of research, studies, programs, and projects, which collectively have yielded a substantial body of knowledge about what works and what doesn't. It's been published in print, is increasingly posted on the Internet, and is therefore available to anyone who wants it. For example, a new book, *New Formulas for America's Workforce: Girls in Science and Engineering*, showcases what has been learned from over 200 projects funded by the Research on Gender in Science and Engineering Program at the National Science Foundation (National Science Foundation, 2003). Eighty-seven projects are listed under the entry "teacher training." There are hundreds of others sources as well, including my own research review on gender and technology in education. (Sanders, 2005)

Second, we have learned that by and large, expensive *resources* are not required to correct gender inequities in computing. We don't need elaborate materials or high salaries or laboratories or buildings. What we do need is

training to impart the knowledge, which costs a little, and administrative support, which costs nothing. Gender equity in IT is just not very expensive to achieve.

This leaves *resolve*, which in fact seems to be the key missing element. I see it at the pre-service level in teacher education programs, where gender is now without a doubt the invisible social justice issue. Teacher education commonly addresses disability issues, multi-cultural concerns and increasingly socio-economic issues as well, but gender is typically nowhere to be found. In a survey that Pat Campbell and I conducted in the late 90's, we found gender to be woefully uncovered in teacher education programs (Campbell & Sanders, 1997). The least covered gender equity topic of all was Title IX, the federal law that mandates gender fairness in schools receiving public funds. In 2004, teacher education participants in my Washington State Gender Equity Project and I were instrumental in getting the state requirements for teacher and administrator certification amended to include gender. As far as I know, Washington State is the only state in the US to have strong gender requirements for new teachers' and administrators' certifications.

Resolve also matters at the in-service level, with teachers and administrators. This is in part an issue of leadership at the district and building level: gender equity fares better with superintendents and principals who consider it important. They can make in-service training possible, can send teachers for training, and can provide incentives and disincentives for teachers and counselors commensurate with the extent of their gender equity progress. Resolve matters individually as well: teachers choose conference sessions to attend and they choose articles to read in professional magazines. Many of them also choose professional development summer programs as well.

If I am correct — if in fact the slow progress of gender equity in technology is not due to a lack of knowledge nor to a lack of resources but rather to a lack of resolve — then to make more progress this is what we have to address. With it, teachers will obtain the knowledge and the few resources they need. In other words, we have been concentrating so hard on supply (knowledge and resources) that we have been ignoring demand (resolve).

We must move gender equity in IT from its vague place far in the background of educators' professional consciousness to prominence as an issue that educators want to deal with.

<u>Why educators resist gender equity in computing</u>

I am convinced that the slow gender equity progress we've seen in IT is due to a number of quite natural, quite human, quite understandable reasons.

First and perhaps foremost, teachers believe that because they are not intentionally discriminatory — and they are not — they think that the gender imbalance they see — if and when they see it — cannot be helped. They wish it were otherwise and they often try to encourage girls to continue in computing.

When their efforts don't bear much fruit, they tend to be resigned to the status quo. Researcher Tom Kibler calls this the "pure of heart" model — if one means well, then that is sufficient. It's also what Virginia Valian means when she speaks of the inadequacy of good intentions (Valian, 1998). Teachers sincerely believe that because they consciously mean no harm, they cause none. They have no idea that differences in treatment of students are usually below the level of conscious awareness, and they certainly have no idea of the cumulative power of these small differences.

Sometimes teachers resist gender equity efforts because they see them as discriminatory. Fairness, to them, means being even-handed or treating everyone "the same." Since they fail to realize that they are not in fact treating males and females the same, they tend to see gender equity as *favoring* girls, and increasingly they see it as occurring at the expense of boys. They have a hard time seeing that being even-handed when conditions are not equal is hardly equitable. It's like calling a race fair because the start and finish lines are the same while ignoring the fact that the runners consist of neighborhood joggers and marathon winners.

Books and articles published in the last few years about gender equity for boys, important as they are, have had the unfortunate effect of framing the gender issue as "either/or." It is true that there are many gender issues for boys, and education would be better off if they were dealt with. Boys underachieve in reading and writing and they are the perpetrators of nearly all school violence. Both problems are related to common notions of masculinity and therefore are important gender issues that are not recognized as such. Be that as it may, an either/or mindset pits victim against victim: who suffers more? The notion that both do, differently, seems not to occur to many teachers.

Some teachers do make progress on recruiting and retaining girls in computing classes, and that brings up another problem. If a teacher manages to go from 10 percent girls to 20 percent girls in her or his class, she or he is justifiably delighted. Often progress is confused with success, though, so the doubling in the number of girls gets more notice than the 20:80 imbalance ratio.

A variation on this theme is even more frustrating. Sometimes a teacher will have a success with one or two girls, meaning that the teacher succeeds in getting these girls to take higher-level computing courses, or the girls go on to major in computer science in college. These results feel good, and teachers don't recognize them as exceptions to the more general rule of girls *not* advancing to higher-level courses and *not* majoring in computer science. As my colleague Pat Campbell puts it, they think the plural of anecdote is evidence.

The sex of the teacher can have a negative impact on gender progress in IT, but perhaps not in the way you expect. It relates to the way that people who do not understand how gender bias really operates conceive of its cause — that male teachers are *a priori* guilty and female teachers innocent. I've often seen that female teachers tend to think they are exempt from concerns about gender bias because of their femaleness. Male teachers often think that because they are men

there is nothing they can do to make a constructive difference. Neither is true — men and women are equally sexist, in my experience — and in the meantime the gender imbalance continues.

One thing that hinders progress is that many teachers see gender equity as a sideline to their *real* work of teaching computing. Partly because teaching computing is truly a full-time job — particularly in large cities where five or even six classes a day, sometimes with different preparations, is considered normal — teachers often want me just to tell them what to do and be done with it. I maintain that you can't fix anything unless you know what's broken and insist that we have to go through the "moan and groan" part before we can get to the solution part, but I am aware that many teachers just want answers the quickest way possible. This is not reassuring for the future.

Partly because gender is seen as an issue of the past and because racial/ethnic differences are much higher in teachers' awareness as a major educational problem, I find that building-level and district-level enrollment and achievement data are often not disaggregated by sex. As a result, classroom teachers tend to be the only ones who really notice a sex imbalance. If no one at the building or district levels knows that girls are under-enrolled and under-achieving in computing courses, it's pretty much a sure bet that the problem won't be addressed.

A related fact is that computer teachers, much like other teachers, administrators, and counselors, are not aware of data or broader gender issues that could illuminate the computer gender gap for them because when they took their education courses in college or graduate school, gender was in all likelihood barely mentioned or not mentioned at all. Education texts rarely mention it (Zittleman & Sadker, 2002), and most teacher educators don't mention it either (Sanders, 2003). Although gender is a major issue for girls in computing, it tends to be included in technology and science methods courses only if the instructor happens to have gender as a particular, and personal, interest. Such people are rather rare.

Then there are the longitudinal aspects. Much of what we know about gender has been learned over the past two or three decades in grant-funded research. In the United States, for example, by far the major source of funds for research in gender in technology, math and science is a program in the National Science Foundation called Research on Gender in Science and Engineering. This program, in existence since 1993, has funded 314 projects as of this writing. Projects are funded for up to three years, not a very long time. Few other funders support long projects for the same reason: longitudinal projects are expensive. As a result, our knowledge is skimpy about the long-term effects of what we do. Teachers, however, think they know. When a few female students majoring in computer science come back to visit their old high school computing teacher, the teacher feels she or he has beat the gender odds. The teacher doesn't stop to think that the young women who never go on in computer science, or who try but drop out, are not likely to come back and announce their "failure." In reality, the plural of anecdote is not evidence.

<u>What we don't know</u>

I don't want to give the impression that we gender equity specialists know all there is to know and that it's teachers' fault for not falling in line. I just mentioned the dearth of longitudinal studies. Granted, long-term studies are expensive, logistically difficult, and require large samples to counteract the many intervening variables. But without them we can't be sure that an intervention at the high school level, much less at the middle school level or below, will in fact have a long-range impact.

We don't know the relative effect of one type of intervention as compared to others. For example, many gender projects have tried role models, teacher training, curriculum changes, mentors, hands-on experiences, summer enrichment programs, and many, many additional interventions. Which work best with girls of different characteristics (age, race/ethnicity, socio-economic level, and others)? We don't know. The *New Formulas* book referred to above has an index of 37 large pages in small print, with interventions from activity-based learning to writing (National Science Foundation, 2003). The best we can do now is choose interventions based on guesses that are somewhat informed by the research, but they are still guesses.

We also don't know what makes one university or district or school, or individual teacher for that matter, make big gender equity changes while others with the same interventions do not. This is so whether the educational units are solicited to take part in a gender project or whether they freely choose to apply for one. I am sure I am not the only person to teach a workshop or series of workshops to teachers who all have computer gender gaps in their classes, and find that teachers don't respond the same way. More precisely, I tend to see a bell curve: some teachers do spectacularly well in making changes and reporting increased female enrollments and test scores, some do nothing at all and have no change, while the majority fall in between. Is this due to signals I am sending without being aware of it? To differences in their personal or profession backgrounds that result in hearing me differently? To differences in the conditions of their jobs such that some feel overloaded by other responsibilities while others feel able to take another one on? It is commonly thought that to reach an adult on female gender issues, it's best if that adult has daughters. We don't even know if this is true.

Even when well-established programs are out there, heavily publicized, and even supposedly sought out, why aren't they replicated? As many gender equity specialists in IT know, Allan Fisher and Jane Margolis managed to raise the female enrollment in the School of Computer Science at Carnegie Mellon University in Pittsburgh from 8 percent to 42 percent in five years. They gave many presentations on what they did at professional meetings and wrote up how they achieved their stunning results in a book aimed at the public as well as the computer science establishment (Margolis & Fisher, 2002). Since the publication of their book, Jane and Allan did a nationwide book tour and Allan in particular has been invited to speak at many schools and colleges of computer science

across the U.S. Recently I asked him how many of them had replicated his model. None, he replied, although one seems to be making progress in that direction (Allan Fisher, personal communication, July 29, 2004). Why, when there is virtually a recipe for gender progress available and when universities are interested enough to pay the costs of inviting an expert to campus to speak about it, is there still no action? We don't know.

One thing is clearly our fault. Like the young college women who choose whether or not to visit their high school computing teachers, we are eager to spread the word of our successes and disinclined to announce our failures. Each of us knows, however, that we probably learn even more from our failures than from our successes, and we also know — in theory — that failures are unavoidable when we don't know all the answers in advance. Nevertheless, we act as if a failure is a personal shame as opposed to something that can help us and our colleagues learn. One of the best conference sessions I ever organized was one I called "Snatching Defeat from the Jaws of Victory." The panelists I invited to participate were people who had done ground-breaking work in gender and other social justice issues in education. Each of us described a major failure and what we had learned from it. Ideally, there should be no need for such a session: we should present our failures as readily as our successes as a service to our colleagues.

What seems to work

I include this section with some trepidation: I have no idea if what works for me works for everyone, and I also know that nothing I have tried works with *all* teachers. Nevertheless, just as I have learned many things about what tends to discourage computer teachers from tackling gender equity, I have learned a few about what seems to make some of them, at least, want to.

As the starting point, I learned long ago that before I even step into the room, teachers are defensive because at best they think they're in for a session of politically correct pious platitudes, and at worst that I will blame them for the gender gap even though they are positive it is not their fault. It's a short step from defensiveness to resentment or even anger. The best I can hope for is skepticism. As a result, the first thing I have to do is defuse the resentment, because otherwise they will refuse to learn anything.

The most important thing I can do to defuse resentment is to explain and emphasize the universality of gender bias. When we all can't help learning gender schemas, as Virginia Valian calls them (1998), from our first moments outside the womb — the baby X and early childhood studies are invaluable here — blame makes no sense. When teachers understand that most gender bias takes place inadvertently because it is both sent and received below the level of conscious awareness, they can stop being defensive. After all, what teacher is *deliberately* biased? And when I tell them that I too am gender biased, and tell them how observers taught me that without realizing it I made more eye contact with males than with females, they are safe in recognizing their own gender bias. At this point, teachers become a little bit willing to listen.

The next best thing is to use local data whenever possible. For example, I have been working with Advanced Placement high school teachers of computer science, chemistry, and physics in Dallas that was funded by the Women of Texas Instruments via the Dallas Women's Foundation (Sanders et al., 2004). In the United States, Advanced Placement courses are available at many high schools to offer students college-level courses; if they pass the exam they earn transferable college credit. That project started with local data when it was discovered that girls who scored very highly in a standardized math test (the math part of the Preliminary Scholastic Aptitude Test, or PSAT-Math) failed to score as highly in the Advanced Placement exams and therefore were significantly less likely to pass the exam and earn college credit. Obviously, these girls' ability was not the culprit here. When I showed the data to the teachers, they had to admit that something else had to cause the difference. In situations where I can't get local data I use national data, but local is preferable by far. At this point, teachers are a little more willing to listen.

The third thing I try to do whenever possible is to stress the importance of teachers finding out about gender bias for themselves. I tell them that of course I am a feminist, but ideology is not what the workshop is about. After all, if I myself wouldn't just take someone's word for something — "Trust me on this" is not a convincing argument! — why should they? One way to do this is to give teachers "mini-assignments" in advance of the workshop to check out the gender situation in society. For example, I ask them to analyze gender messages in toy stores, greeting cards for children, children's television shows, web sites for children, computer stores, and magazines for teenagers. I ask them to do surveys of families with children to find out who does which household chores and whether the chores are gender-stereotyped. It is important for them to see that gender bias is pervasive and systemic, not something occurring only in classrooms. This is partly to minimize blame and guilt, but partly to help them achieve an accurate understanding of the scope of the problem. It also helps to bring them a little further along the path of being willing to consider gender as an explanation of why girls tend to under-enroll and under-achieve in technology.

I have found again and again that the hands-on activity that makes the most difference with teachers is to ask them to be observed in their classrooms for gender bias — which, as I keep reminding them, is inadvertent. There is nothing new about teacher/student interactions that vary by sex of student (not by sex of teacher, which always surprises them) — the research has been out there for at least twenty years — but it remains extremely powerful. I give teachers a list of behaviors which research has shown to be significant in terms of gender, such as calling on students, amount of eye contact, body position near students, higher- or lower-order questions, wait time, and many more. I show them how to tally the behavior, and suggest that the observer might be a colleague, a trusted student, or oneself via videotape seen after the class. They choose the behavior to be tallied and the observer to do the tallying. Once teachers do this, they're skeptics no longer. Discovering that you are favoring

boys in class without meaning to and without even realizing you are doing it has a phenomenal impact.

Recently in Dallas we had a dinner session for the teachers, their principals and their guidance counselors. From the transcript, one of the teachers, a man in his 30's, said this to the administrators:

This project has made more change in our classrooms than just about anything else we've been doing... We want you to give us more opportunities to help other teachers move from the skepticism where all of us honestly started, severe skepticism. I was more than skeptical. I thought it was just more left-wing baloney crap. I really did. (Laughter.) And when I saw the hard data, I was willing to listen, okay? And when I began to actually try things in my classroom and saw the change, I was stunned, I was shocked — I really didn't think it was going to work. The difference is not just tangible; it is overwhelming. I have more than 100 percent more girls in AP this year than last year. And the difference is in the teaching, in how I treat the girls. Daniel Brown.

There are several other things I find helpful. One is repeated training sessions as the best form of follow-up. In Dallas, for example, I met with some teachers nine times over two years and four times for another group over one year. Before each session they complete different mini-assignments, and at each one I presented new and different material. They also had a chance to discuss what changes they are seeing in their classrooms and their own teaching behavior. Follow-up is essential because it counteracts the natural tendency to let gender equity slide to a back burner when other parts of your professional life can require more attention. Repeated sessions in particular are valuable because they provide time for teachers gradually to come to their own conclusions — much more important for them than *my* conclusions! — about the role of gender in the classroom and to share them with their peers.

Presenting research on gender is also helpful. Once teachers leave college or graduate school, their continuing education tends to be somewhat less than stimulating. As another of the Dallas teachers put it:

It is not often that classroom teachers are made to feel like professionals. Our staff development opportunities are usually geared toward the lowest common denominator and fail to use even a modicum of good teaching practices. This project was different. We were given real data from educational journals, the context in which to understand it, and concrete methods to change our own classroom instruction and get quantifiable results. We were treated as collaborators, instead of people to be lectured at. Rebecca McGowan Jensen (Sanders et al., 2004*)*

It is good, especially at the beginning of a project before teachers become involved, to think quite deliberately about the WIIFM rule (pronounced "wiffim"): What's In It For Me? We gender equity specialists think all too often that pure virtue and altruism are enough to carry the day, but it is not true. Teachers, above all those in large-city school districts, tend to have heavy

teaching loads and full schedules. They are far from convinced that gender equity is important — an understatement there — and shouldn't be blamed for not flocking to volunteer for even more work. This is a big issue for getting teachers in the room to start with; once they are there, the techniques I described above have time to work. Paying them for their time helps, and it's only fair — other professionals aren't routinely expected to donate their time for a professional activity. If paying them is not possible, then some other advantage must be found that will appeal to busy and skeptical teachers. It might be continuing education credit, a drawing for a gift certificate or other prize that has been contributed by a donor, positive publicity for their schools, certificates with which to impress their principals, or anything else they consider valuable.

Something that helps with teachers, and that I tell them helps with their own students, is explicitness. I am aware that the literature contains a number of references to the importance of modeling the desired behaviors, but frankly I have never found it to be so. Without explicitly pointing out why I am doing what I am doing, all the gender-fair good teaching in the world makes little difference. One of the Dallas teachers conducted a unintentional experiment about explicitness:

I informed three of my six classes explicitly about the changes I was making in my teaching style and why I was making them. I did not inform the other three classes. I saw much more boldness and confidence from the girls in the classes where the announcement had been made. Daniel Brown (Sanders et al., 2004)

The girls in the classes where he had happened to mention the gender equity project were less likely to tolerate interruptions from boys and more likely to trust their own abilities. Boys, similarly, learned to be less dominating, also a good lesson.

I have also found it essential to vary the activities in a workshop as much as possible: not just lectures with visual aids and videotapes but a variety of participatory activities. This is related to the evaluations I ask people to complete at the end of each workshop, whether or not I will see them again. Over the years I've honed it down to only three questions: what was most useful, what was least useful, and give the workshop a grade from A to F. In a successful workshop, responses to the first question (most useful) are all over the map, with different teachers identifying different components. This teaches me that different people learn differently, so it's important to give them many entry points into the topic. If responses to the second question (least useful) show a trend, with a significant number of teachers identifying a particular aspect of the workshop, then I know I must change that aspect in the future. The last question, (grade A to F) is shorthand for myself and often funders about how much teachers liked the workshop. I never forget, however, that liking the workshop is necessary but very far from sufficient to create change.

Finally, I try to put into practice something I learned years ago from a voice teacher. He never corrected me, never told me I did something wrong or less than best. Rather, he would say, "Okay, now try it this way," or "Good!

What would happen if you did this?" or "That's great! Now do this." Over time, I found that I was singing better and enjoying the lessons a lot. He made me feel competent and skilled. I have tried to do with the teachers I work with as he did with me. In fact, I think of my role as that of a coach, teaching them and cheering them on. It's accurate, too: like singers and athletes, it's the teachers, not I, who need to put what they are learning into practice in their classrooms.

Increasing progress

I have had fairly good success with teachers on gender and IT, once I get them in the door. How do we make teachers more interested in doing something about the computer gender gap? How do we get their administrators to care about it? How do we get more teachers in the door?

One of the answers, I think, is that nearly all gender equity efforts have been piecemeal. We work with small groups of girls or teachers because we can — because funding is available for small projects, because projects of that scope are do-able. We have not been successful in approaching the computer gender gap, and indeed in approaching *any* gender gaps, systemically. There are 14,400 relatively autonomous public school districts, 120,000 schools, and 6,600,000 teachers in the United States. It is simply not possible to achieve widespread action on computer equity piecemeal. We must turn to education systems, and there are only two large-scale systems in education.

The first is teacher education, if it can even be called a system. There are approximately 1,200 colleges and universities in the United States that graduate new teachers and administrators, and they are almost entirely autonomous. However, teacher education is a professional field, and as such it has associations, conferences, journals, and newsletters. Here we have a chance: there are a manageable number of professional associations serving the field. The two major ones are the American Association of Colleges for Teacher Education and the Association of Teacher Educators. There are three major accrediting organizations (but on the national level accreditation is voluntary): the National Council for Accreditation of Teacher Education and the Teacher Education Accreditation Council deal with education programs in colleges and universities, while the National Board for Professional Teaching Standards deals with individual teachers. Teacher education also, like most professional fields, has fashions. Assessment or accountability may be hot issues this year but not next year. All of these associations have addressed gender equity somewhat, but it has never been a major issue with any of them. It would seem that one route to systemic gender equity influence, then, would be to establish it as a high-profile, hot-button professional issue in one or more of these associations.

The second large-scale system unfortunately exists in fifty versions. Each state's Department of Education performs three essential functions with respect to teachers. It accredits teacher education programs at colleges and universities in the state. It establishes minimum requirements for the certification of new teachers, counselors, and administrators, which all institutions granting degrees in education must enable their education students to meet. States also set

requirements for continuing education for teachers, counselors, and administrators. All these functions are codified in state laws and implementing regulations. In some states, including my own state of Washington, a common assessment instrument that is based on state requirements is used with student teachers and administrators. In Washington State the assessment instrument is not a state government function but rather is developed and promoted by the state's teacher education professional association, to which all 22 of the state's education degree-granting institutions belong. Any and all of these functions are susceptible to gender equity influence.

Obviously, influencing an entire profession through its professional associations is not easy or quick. Neither is changing state law. But people created each system, and people can change it.

A second approach that might be helpful is to recognize that we are far too fragmented. Especially because there are so many districts, schools, and teachers, it makes no sense for specialists in gender equity in information technology to push for their cause alone. Are we competing for attention with people who — rightly — consider gender equity in physics highly important? And what about the people whose hot-button issue is women's history, or women and sports?

We can go further along this path. Computer equity for girls is not only a subset of gender equity issues for girls in general, but a subset of gender equity issues for everyone. Girls surely are not the only ones who are harmed by our narrow and increasingly outdated notions of femininity and masculinity. Boys underachieve in reading and writing to a much larger extent than girls underachieve in math, science, and technology. Schools are plagued by acts of violence, bullying, and overbearing behavior that are mostly perpetrated by boys. Both problems are best understood and addressed as gender equity issues: writing and reading are seen by many boys as "sissy," and many boys see violence and related behaviors as ways to prove their masculinity.

And the path leads us further still. Gender equity in turn is a subset of social justice issues in schools. We cannot say that a girl who is effectively denied a chance at a technical career is more important than a Black or Hispanic child who is effectively denied a good education. Children with physical and mental disabilities are all too often given educations that fail to develop their remaining abilities. Children who live in low-income areas, primarily but not exclusively inner-city and rural areas, are notoriously under-served by the education establishment. So are homeless children. So are children whose parents have deficient educations themselves. In all these cases, children fail to receive educations that stimulate them to achieve to the best of their ability because of the chance circumstances of their birth.

At the present time, many people are working to improve education for girls, for boys, for children of different ethnicities and races, for children with different disabilities, and for children of various socio-economic levels. We do not work together. We don't even know each other. Perhaps acting together to

influence education under the banner of social justice we might achieve more, and sooner, than we do separately.

Education is the best way we have in society of helping the new generation achieve more and better than the previous one. We've been trying to work harder to influence it, but progress has been frustratingly inadequate. It's time to work smarter.

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