

Approaching Technology

By Cornelia Brunner, Center for Children and Technology, EDC

Consider the following scenario: The social studies teacher calls the class in the computer lab to order. He is integrating technology into his curriculum. Last week, all students—fifteen girls and fifteen boys—learned how to use an Internet browser, even though there are only eighteen computers in the room. They paired up and took turns; now they all know how to navigate, find the major search engines, enter a query, and bookmark a site. This week, he wants them to learn to use the Internet for research. He divides the students into ten groups of three and gives them a common assignment: Find out why the Leaning Tower of Pisa leans. The first group to come up with the answer wins.

A pan around the room a few minutes later would show that, in one corner, a group of boys are still arguing about the best search engine to use. Each has a favorite and a theory about why it finds more stuff or does so faster. Other groups have started entering search terms into various search engines. One boy shouts triumphantly that he has over a thousand hits.

On the other side of the room, a group of girls have asked permission to go to the library because they know about a book on Italian architecture. Another group of girls spends most of the period looking at a street map of Naples and talking about Italy and Italians, while one girl keeps reminding them that they're supposed to be trying to find out why the Leaning Tower of Pisa leans.

As the class ends, not a single group has found the an-

swer to the question. The teacher urges them to keep digging and to refine their search terms in the way he taught them. He also uses the opportunity to remind them that this is the time to sign up for the elective mini courses, including the one he is offering about the Internet. When he looks

at the sign-up sheet after the students have left, there are sixteen names—fourteen boys and two girls. The teacher is pleased, having expected only about a third of the class to sign up. He notices that there are few girls, but he expected that, too. What happened?

Research

The American Association of University Women recently published a report on the gender gap in technology education. I was a member of that commission because some years ago, we at the Center

for Children and Technology did a series of studies about gender differences around attitudes and approaches to technology. We found, to nobody's surprise, that girls are more ambivalent about technology than boys, who are more positive; that boys are more excited about their experiences with technology, particularly video games, while girls like videos (that is, stories) and tend to get bored by bad technology experiences. Girls are also less likely than boys to attempt to fix a broken piece of technology. And when asked about a "technology nut" they knew, all the kids in this study talked about a male.

As part of our research, we asked architects, engineers, scientists, video editors, film makers, software designers, hardware developers, and students ages 11–18 to describe their feelings and fantasies about technology. We found that the expert women and men in our sample had very different expectations of and feelings about tech-

About This Digest

Ten years after we published our first digest on computers and technology, many of the same concerns regarding equity remain. This issue of the *WEEA Digest* looks at the current issues for equity in education with a focus on computer technology.

As always, we offer resources on the topic and provide a space to continue the conversation in our online discussion list, EdEquity (www.edc.org/WomensEquity).

Inside:

Balancing the Equation	3
Getting Girls Interested in Computer Science	5
Girls' Perspectives on the Computer Culture	7
The Appeal of High-Tech Careers	10
WEEA Resources on Technology	13
Additional Resources	14

Continued p. 2, "Approaching Technology"

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Approaching Technology . . . continued

nology. We came to think of this difference as a feminine and a masculine voice in the technological universe. Not all the women we studied spoke in a feminine voice, nor did all the men speak in a masculine voice, but the differences we found were clear and dramatic and in keeping with gender differences found over the years in other studies.

These differences can best be summarized as follows: Feminine expectations for technology are about small, flexible objects that can be worn or carried around easily and that allow women to communicate and connect and to share ideas and stories. Masculine fantasies are about magic wands or brain implants that allow men to transcend the limitations of time and space.

We found the following themes recurring in the beliefs spun by adults and children about the future of technology:

Adults' Masculine Beliefs

- Technology is seen as a source of power.
- Technology is appealing because it increases human command and control.
- Technology conquers nature.
- Bionic technology allows us to vastly increase our physical and mental prowess.
- The emphasis is on one-way communication—for instance, a brain link that provides access to all the genius minds in history.
- Tools do the work for us.

Go Online with WEEA

Visit Equity Online—the WEEA Equity Resource Center's website—for instant access to past *WEEA Digests*, parent-friendly Spanish language resources on gender equity, archived EdEquity discussions, and frequently asked questions and answers on topics such as ensuring compliance with Title IX and engaging girls in math, science, technology, and engineering. Take advantage of the WEEA Center's links and connect with over one hundred other organizations that can help infuse equity into the classroom.

www.edc.org/WomensEquity

Adults' Feminine Beliefs

- The focus is on technology as a medium.
- Electronic media are used for their expressive qualities.
- There are questions about the effects of technology on nature.
- Technology's promise is its power to heal and nurture.
- Communications technology is used to have conversations with others like us.
- Tools facilitate work.

Children's Masculine Beliefs

- fast vehicles, powerful weapons, and all-encompassing entertainment machines
- tools that make other technological objects and overcome natural constraints
- often expect violence from a fantasy machine

Children's Feminine Beliefs

- compact, flexible household helpers and communication machines
- machines that offer companionship and help with social and personal problems
- afraid they will harm the machine by misusing it

What are some implications of these differences for the use of technology in the classroom? We often place emphasis exclusively on wiring and on using the Internet as a library—an information resource, from encyclopedias to primary source materials. We do not place enough emphasis on preparing teachers to make use of the communicative and creative potential of computers because much of our discourse about technology integration takes place in a masculine voice. To invite women and girls into this new medium, we have to embed the use of technology in rich, meaningful projects and classroom assignments.

In the current climate of high-stakes accountability, we also have to help teachers develop useful and appropriate criteria for assessing the production values of student-produced multimedia reports, since they tend to take up more class time than traditional, written reports, rather than focusing exclusively on their content. The more emphasis we place on computers as useful tools for sharing ideas with others, the more attractive the medium will become to people with a feminine perspective on technology. ♦

Balancing the Equation

Researched and produced by the National Council for Research on Women; written by Mary Thom

As the economy in the United States and the world grows more and more reliant on a technologically literate workforce, the nation cannot afford to overlook the talent and potential contributions of half the population. Women and girls and others who are underrepresented in the sciences offer valuable new perspectives that will affect both the goals and practices of technological work and research.

Much work has been done, particularly in the last two decades, to pinpoint the needs of women and girls in science, engineering, and technology and to develop programs and interventions to encourage their progress. However, changes need to reach deeply into the culture to permanently alter the institutions at which science is taught and practiced. *Balancing the Equation: Where Women and Girls Are in Science, Engineering and Technology* reports far-reaching strategies that women, and men, have developed to turn programmatic progress into lasting change.

A Critical Moment

The twentieth century saw women struggle for recognition as scientists and engineers, some with notable success. Programs that began in the 1970s and gained momentum in the 1990s, recognize an uneven playing field and attempt to improve women's chances for success. Several events and conditions make this a particularly good moment to evaluate these endeavors and look to the future:

- In the spring and summer of 2000, the international community gathered to assess the promises made in the plan of action passed in 1995 at the United Nations' Fourth World Conference on Women, held in Beijing. Issues concerning women and technology were put forth as essential parts of many of the goals outlined in the plan of action.
- The success of the Human Genome Project and other advances mark a leap in technology, particularly in biotechnology, where women are poised to make significant contributions because of the relatively large number of women in the field.
- In health research, a National Institute of Medicine report called "Does Sex Matter?" confirmed that gender differences affect not

only the sexual reproductive capacities of humans but also biological functions from "womb to tomb." The differences start at the cellular level and must be taken into account more broadly at all levels in biomedical and health research.

- Critical national debates are going on today over such issues as affirmative action and funding for science and technology research; women have a great stake in these policy discussions.
- Women and men in science and technology are seriously questioning the trade-offs demanded of them in terms of their work and family life, particularly in the demanding postgraduate-training stages of their careers.

Even with the considerable progress made by women and girls in science and technology, too many women still feel they learn and work in unfriendly or hostile environments in labs and other technological workplaces. However, in all fields and in major technology corporations, women have formed national organizations and networks to support one another, develop visible leadership for change, and advance an agenda of equity. These groups have made considerable efforts to reach out to women and girls of diverse ethnic and racial backgrounds and to those isolated because of cultural factors or geography.

Training the Nation's Girls and Young Women

In the overall effort made in recent decades to better educate young people in science, technology, and mathematics, girls made rapid progress; the gender gap in science and math achievement has narrowed significantly. However, studies still reveal weaknesses in the training of girls. Young women, for example, exhibit less confidence in their math skills than young men. At higher levels of math achievement, high school boys still outperform girls.

Inclusive, engaging teaching methods developed to encourage girls to perform well in science and technology have been found to be very effective for teaching boys as well. Tested programs improve the competence and confidence of elementary school science teachers, and there

Continued p. 4, "Balancing the Equation"

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Balancing the Equation . . . continued

are new programs to train instructors in information technology and other expanding fields of mathematics, and engineering majors through a variety of interventions. Researchers found that women studying science tend to feel rewarded by praise from professors, while men feel rewarded by such things as competition among peers. The following strategies have been developed to appeal to women in undergraduate science courses: mentoring by professors and upper-class students, the opportunity for undergraduates to perform hands-on research, and curricula designed to emphasize the problem-solving applications of science and technology.

Within science departments, the educational environment for undergraduate students, both women and men, can be a disincentive. Successful programs encourage faculties to value undergraduate students and train teaching associates to nurture, rather than discourage, potential science majors. Advocates advise replacing gate-keeping courses designed to weed out students with curricula that invite students into disciplines that are male dominated, such as computer science and physics.

New curriculum initiatives, designed to draw talented women into technical careers and increase science literacy overall, offer cross-disciplinary approaches that may meld women's studies courses with science training. Other innovative degree programs combine liberal arts and engineering majors.

With leadership from the top and carefully designed research that accurately identifies factors that discourage women, institutions can successfully attract and retain women students—even in computer science, where the proportion of bachelor's degrees earned by women has been declining. At Carnegie Mellon University, the percentage of women in first-year computing classes rose from 8 percent to 40 percent over a five-year period. Rensselaer Polytechnic Institute has greatly improved its retention rate of women in engineering and technical majors. Women's institutions—such as Smith College, in Northampton, Massachusetts, and Spelman College, in Atlanta—have been successful in recruiting women into engineering and other technological majors.

Graduate School and Beyond

In graduate and postgraduate science and technology training, pressures on women and men increase. The time it takes to earn science Ph.D.'s—too often it takes more than 15 years from entering college—discourages young academics who

have family demands, and women tend to drop out at nearly every transition point.

Programs address the need to support women at the assistant professor level so they can procure tenure track appointments. For example, the Clare Booth Luce professorships provide a useful spotlight on women early in their academic careers, gaining them seats on faculty committees and other policy-making opportunities. These professorships recognize the varied needs of women beginning their science careers by offering flexible stipends that can be used for childcare or for travel to professional conferences.

Despite progress made over the last decade, men continue to dominate science and technology faculties at the highest levels. Leadership by major institutions can make a difference in keeping talented women in the pipeline so that more attain senior faculty positions and leadership roles in their fields. An MIT survey that demonstrated how women faculty and researchers have been shortchanged over the years led to changes that increased the productivity of MIT women. Other leading research universities have pledged to make similar efforts to improve the status of women faculty. A new National Science Foundation initiative invites institutions to design programs that will lead to systemic change to improve the status of women in scientific and technical fields.

Business and Industry

Many women scientists and engineers leave academic life early in their career, having concluded that industry offers fewer barriers for their advancement. Corporate leaders agree that the “bottom line” has become a strong inducement to recruiting women and underrepresented minority men, given the continuing needs of a technological workforce.

Still, prior to their entry into the marketplace, undergraduate and graduate science majors need ways to educate themselves about diverse opportunities in the technology workforce, since students in academic settings report a lack of information about careers. For example, some four-year institutions offer new degree programs that meld business and management training with science and technology curricula.

Leading science and engineering corporations that are concerned about advancing women encourage networking among their female em-

Continued p. 5, “Balancing the Equation”

Getting Girls Interested in Computer Science

By Cynthia Lanus, GirITECH

If a report from a March 1997 Gallup poll is correct, we may be making progress toward getting girls interested in computers. The survey found “relatively small differences between girls and boys in terms of their general orientation toward technology.” The 13- to 17-year-old boys and girls surveyed reported equal levels of both computer usage and skills. The National Science Foundation (NSF) published an executive summary of the poll’s report conducted in conjunction with CNN, *USA Today*, and the NSF.

Computers dominate practically every phase of the workplace, making it absolutely critical to get girls interested, competent, and capable in their use. However, there is a separate issue that

the report does not confront—fewer women are entering the field of computer science. Between 1985 and 1995, women went from earning 36 percent of the computer science bachelor’s degrees to earning only 28 percent. A full report on these statistics was published by the NSF.

Does the reported equality in male and female teens’ computer use, if it exists, transfer to equality in computer science? With girls making up only 17 percent of test takers in the spring 1997 Advanced Placement computer science exam (practically concurrent with the Gallup poll), a huge gender inequality clearly still exists in computer science.¹

Continued p. 6, “Computer Science”

Balancing the Equation . . . continued

ployees. This helps to alleviate isolation in a male-dominated workplace and to make women leaders more visible. With an eye to the future workforce, forward-looking employers also encourage female employees to be role models for girls and young women in their community.

Many women scientists and engineering professionals cite the integration of family life and work as a primary concern. Since women scientists often marry other scientists, it’s common for both partners to be affected by the demands of a technical career. Major companies have taken the lead to decrease turnover by offering sabbaticals and work-at-home options. Many women in high-tech jobs leave the corporate workforce to become self-employed contract workers, a strategy that gives them more control over their work schedules.

In the growing biotech industry, women are poised to make major inroads because of their numbers in biology undergraduate and graduate programs. Studies suggest that the scale of biotech work, with many products being developed in relatively small workplaces, provides many opportunities for women scientists and researchers. Still, these same studies show that women are scarce at top levels of research and administration.

Strategists cite information technology as a field that offers women opportunities to choose technical work with social content. In San Francisco, an innovative incubator project called the Women’s Technology Cluster invests in women entrepreneurs launching high-tech businesses and

calls on successful graduates to contribute resources to women following in their footsteps.

Into the Future

National advocates for women in science and technology stress the importance of leadership at major educational, corporate, and government facilities to achieve institutional change. In secondary education and undergraduate studies, a cross-disciplinary curriculum is key to drawing young women into science and technical careers and to improving science and literacy throughout the nation. The need for mentors and networking for girls and women in science begins at the primary school level and continues through graduate education and careers in business and industry.

Only a broad effort based on a wide consensus will transform the culture of science and technology, which has discouraged and excluded women and minority men. To that end, strategists need to look at women’s progress in science and engineering in the United States in the context of what women engineers, for example, have achieved in other countries. New research must accurately track the different experiences of women scientists and engineers depending on the community from which they come and the setting in which they work. ♦

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Computer Science . . . continued

Liking Computers Is Not Enough

Increasing girls' computer use may be necessary to increase girls' interest in computer science, but it is not enough. After all, computer science isn't really about computers. Computer science (which really should be called computing science) is the study of computation; computers are merely the tool performing the computation. Saying you want to be a computer scientist because you love computers is like saying you want to be a writer because you really love word processors. Computer science is just that—a science, with problems, conjectures, explorations, tests, and solutions.

Maybe this difference between computer use and computer science helps to explain why so many students enter college as computer science majors and change majors after their first or second computer science course. Recently, in scholarship committee interviews at Milby High School, where I taught mathematics, several students indicated their intended major as computer science, yet had no computer science courses on their transcripts. When I asked them why they chose that major, they answered, almost unanimously, "I really like computers." Many of these students were girls—further evidence that perhaps we are making progress in girls' attitude towards computers.

But what they mean when they say they "really like computers" is that they like using applications, word processing, spread sheets. They like the Internet, keyboarding, and games. One student told me recently that she likes pushing buttons and having words appear. It's good that these girls like computers; I doubt they would even consider computer science if they didn't. But liking computers is not enough.

MIT commissioned an interesting study to determine why the percentage of their students choosing electrical engineering or computer science (EECS)—19 percent women—is lower than MIT engineering as a whole—29 percent women. The most telling result of the two student surveys was that women, much more so than men, felt less prepared to major in EECS than their peers.²

Girls' failure to take Advanced Placement, the highest level of high school computer science courses, could contribute to the preparation issue. In last year's Gallup poll, only a third of all students (male and female) felt their computer education was on track to teach them all they need to know by the time they graduated from high school; the rest felt that their schools should be teaching them more.

Paving the Way for Future Scientists

Who knows whether the Milby High School students will like computer science and become computer scientists. Will it dawn on them in their first computer science course late one night that this isn't what they expected it to be? What will they do when they're in a class of hackers that have already aced two advanced computer science courses in high school? Perhaps they will decide they like computer science, or even love it, the way these computer scientists from Rice University do:

We are computer scientists. We wake up every morning in love with what we do. We love computer science because it exercises both our creative and our logical sides. Unfortunately, people often misconceive computer science as a dry and impersonal area requiring only technical skills. We would like to offer a contrary, insider's view of our field.

Computer science is not only about logical thinking. It is true that computer systems (both hardware and software) work according to precise rules. However, these systems consist of many, many pieces; the challenge lies in building and combining them. Some of the pieces already exist, but it takes creativity to put them together. The pieces that don't exist must be designed, which requires innovation. Assembling the whole system needs teamwork.

The process is as creative and human as writing poetry or composing music. But computer scientists also develop products that have an immediate, direct, positive impact on people and society, which is deeply gratifying. We feel that few other disciplines require the same, unique blend of creativity and insight with problem-solving skills. That's why we are computer scientists, and there's nothing else that we'd rather be.

—Shriram Krishnamurthi and Kathi Fisler,
Computer Science Graduate Students,
Rice University

We must do a better job of getting all students ready for computer science. We must encourage girls to begin taking the highest levels of math, science, and computer science offered at their schools. And we must expect that women will become computer scientists. ♦

Reprinted with permission from Cynthia Lanius, "GirlTECH: Getting Girls Interested in Computer Science," <http://math.rice.edu/~lanus/club/girls3.html>.

Notes

1. See complete data published by the College Board.
2. Read the MIT committee's recommendations for reducing the imbalance.

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Girls' Perspectives on the Computer Culture

By the AAUW Educational Foundation Commission on Technology, Gender, and Teacher Education

In this article, we use the term “computer culture” to refer not only to the computer that does things for us but also to the computer that does things *to* us—to our ways of relating to others and our ways of seeing the world.* “Computer culture” refers to the social, psychological, educational, and philosophical meanings associated with information technology. And we argue that the computer culture, or the technological mystique, can have a significant and negative impact on education. The cultural emphasis on technical capacity, speed, and efficiency when discussing computers estranges a broad array of learners—many of them girls—who do not identify with the wizardry of computer aficionados and have little interest in the purely technical aspects of the machines. As Commission Co-chair Sherry Turkle writes, the computer culture has become linked to a characteristically masculine worldview, such that women too often feel they need to choose between the cultural associations of femininity and those of computers.

Girls who participated in focus groups commissioned by the American Association of University Women (AAUW) Educational Foundation give voice to the contradictions and tensions in the computer culture. They almost never report overt discrimination: They were not told directly that they were less competent with technology than boys, nor were they openly deterred from enrolling in computer courses. But at the same time, when asked to describe a person who is “really good with computers,” they describe a man. And most of them do not predict that they will want to learn more about or become more involved with computers in the future. In Turkle’s terms, these girls are not computer-phobic; they are computer reticent. They say that they are not afraid but simply do not want to get involved. They express a “we can, but we don’t want to” philosophy.

Strikingly, girls’ views of computer careers and of the computer culture—including software, games, and Internet environments—tend to repro-

duce stereotypes about a “computer person” as male and antisocial, a cliché that has proven resistant to the growing diversity of information technology and its users. Even if we assume that some of the resolve behind the “we don’t want to” attitude is defensive, it is important to understand what girls are defensive about, and to take seriously their critiques of the computer culture.

Stereotypes—Ambivalence and Contradictions

In focus groups, most girls took offense at any suggestion that there may be differences in how boys and girls interact with computers. “[It’s not boys or girls,] it’s just personality,” a Fairfax, Virginia, girl summarizes. Another participant emphatically states, “You can’t base it on the sex. It’s the kind of person.” And girls readily affirm that women and men have equal aptitude in the area of computing. However, in the same conversations, while rejecting generalizations about gender in the abstract, girls reveal a highly developed set of beliefs about how boys and girls differ in their relationship to computer technology. In other words, we found that girls observe and describe strong gender differences but do not have a language with which to talk about them. The result is that girls are likely to express bewilderment and confusion about how they are different from boys in their attitudes and abilities. In girls’ efforts to find a perspective from which to talk about gender differences, they often position themselves as morally or socially more evolved than boys who, they tell us, enjoy “taking things apart” and interacting with “machines.”

As most girls present it, their more limited involvement with computers, especially their lack of interest in games and their lack of interest in having a career in computing, has more to do with disenchantment than with anxiety or intellectual deficiency. Girls say that they are engaged with the world, while boys are engaged with computers. One high school girl brands boys’ relationships to computers as childish: “Immature. They just get worked up . . . they spend all their time on computers and they just never grow.” Girls return repeatedly to a criticism that computers (which they particularly associate with Internet cruising and games) are a “waste of time.” As a

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* For the distinction between the instrumental computer, which does things for us, and the subjective computer, which does things to us as people, see *The Second Self: Computers and the Human Spirit* by Sherry Turkle (New York: Simon and Schuster, 1984) and Turkle, *Life on the Screen: Identity in the Age of the Internet* (New York: Touchstone, 1997).

Continued p. 8, “Girls’ Perspectives”

Girls' Perspectives . . . continued

Fairfax middle school girl remarks, "I don't usually go on the Internet with my friends. I think that I have better things to do with them."

Disenchantment, Not Phobia

Girls discuss information technology-related careers not as too difficult, but as a "waste of intelligence" and, in some cases, as materialistic and shortsighted. Insists one girl from Baltimore, Maryland, "Guys just like to do that: sit in a cubicle all day." One girl imagines she might "think about doing it as a starting-off thing, just to get some money," but once she had the money, she would "go into something that I actually enjoy."

Girls describe gender differences most vividly in relation to the Internet and computer games. They tend to present the Internet as a vice in the hands of boys, and as a virtue in the hands of girls, because boys use it to play games and "fool around," while girls use it as a source of information. When asked to draw two boys talking about a computer one girl depicts "two guys saying, 'Dude, check it out. Let's go look at some pics of Pamela Anderson.' And the other one is like, 'Let's go to the virtually-kill-a-Teletubbie website.'" A group of high school girls in Fairfax, Virginia, were adamant that girls are more able than boys to resist the negative influences of computer culture. One student says, "I think once we [girls] have morals and ideas about something, we can't really be affected by a computer game. I think there might be some people out there who are very weak-minded and when they see that, they go out and do it. Boys are, just in general, more violent." A Richmond, Virginia, group of middle school girls said that video games are more likely to capture boys' interest than girls' because "we have a better social life"; "we probably want to chat and they just want to play something"; and, interestingly, "it gives them artificial power that they feel is important."

Girls have specific criticisms of the violence in current games as well as the general sense that they would be more interested in games that allowed them to create rather than destroy. When given the opportunity to describe their "ideal" computer game, they talk about how they would value games that involve simulation and identity play. They would appreciate opportunities to "work through" real-life problems in the simulated world of the screen. Many describe games that would allow them to swap their identity or face struggles they have yet to encounter.

The Tool/Toy Divide

The focus groups support a recurrent theme in research on gender and technology: Girls approach the computer as a "tool" useful primarily for what it can do; boys more often view the computer as a "toy" and/or an extension of the self (what Turkle has called the projective qualities of the computer, the computer as "Rorschach" or "second self"). For boys, the computer is inherently interesting. Girls are interested in its instrumental possibilities, which may include its use as an artistic medium. They express scorn toward boys who confuse "real" power and power on a screen. "I see a computer as a tool," a high school girl declares. "You [might] go play Kung Fu Fighting, but in real life you are still a stupid little person living in a suburban way."

Because they want to use computers to get things done, girls tend to deem them "boring unless I'm using them for my own purposes." They tend to equate understanding the inner workings of the computer with boys' tendency to be interested in technology for its own sake, something that does not, in the main, capture girls' interests. With sarcasm, a student in Baltimore narrates her sketch of two boys "talking about how [a new program] is going to 'take all my memory because it takes like 200,000 megabytes,' or whatever."

While girls in the focus groups show little interest in the inner workings of the computer, they are very interested in the possibilities of using technology to promote human interaction. Says a Richmond middle school student, "Girls use [the computer] more for communication to their friends. I always like to talk to people online, and my brother just plays games." When asked to describe girls and computers, most in the focus group depict girls talking about talking—asking whether they received the latest email, or assessing the merits of chat rooms. Although these activities may conform to stereotypes about girls' cultures, focus group participants nonetheless see them as more valuable interactions with technology than the machine-centered activities they observe boys to favor.

Girls in the focus groups explain that building human relationships is as intellectually complex and valuable as understanding machines; they question boys' absorption with computers as a substitute for social "skin." As one high school student put it, "Women are into talking to each other and building these relationships, and

[Girls] tend to present the Internet as a vice in the hands of boys, and as a virtue in the hands of girls, because boys use it to play games and "fool around," while girls use it as a source of information.

Continued p. 9, "Girls' Perspectives"

Girls' Perspectives . . . continued

guys—they are not as comfortable with themselves or with each other. They just like to build a relationship by putting it into the computer.”

These girls' descriptions of what boys are doing with technology are missing some very important elements. There is strong value in boys' activities that girls are quick to denigrate. For example, there is intellectual importance to getting to understand computers from the “inside out” and developing skills and an intuitive feel for programming. There is intellectual value in tinkering with technology. And there is no question that there is defensiveness in the way girls denigrate these activities. But it is also clear that getting girls involved with computing will require overcoming resistance based on their negative feelings about getting involved with the machine “for itself.” This resistance also stems from girls' view that a machine-centered, technical worldview is what the computer culture is all about. Girls reject a computer culture that they see as primarily focused on playing with machines.

However, girls in these groups resist the cliché that they do not “like” computers. Rather, they clarify that there are multiple ways of “liking” computer technology. One girl explains the persistence of this cliché as follows: “Girls,” she says, “don't talk about computer stuff as much as guys do. That might give people the opinion that we don't like it as much or anything, but we just don't talk about it.” Girls insist that they like computers; they just “like them for different things.”

Girls' descriptions of computer culture reproduce some powerful, enduring clichés about what it means to work with computers. The clichés, which are about social isolation and an exclusive focus on the machine, appear out of step with recent events and developments. In fact, computer work and human-computer interaction today is diverse. Much of it centrally involves understanding and interacting with people in complex social systems. In order to attract girls and women to computing, we need to broaden the meanings and values associated with technology and technological work.

Reprinted with permission from the AAUW Educational Foundation Commission on Technology, Gender, and Teacher Education, “We Can But We Don't Want To: Girls' Perspectives on the Computer Culture,” *Tech-Savvy: Educating Girls in the New Computer Age* (Washington, DC: 2000) pp. 7–10.

Key Recommendations*To the Media:*

- **Change the public face of computing.** Girls tend to imagine that computer professionals live in a solitary, antisocial, and sedentary world. This is an alienating—and incorrect—perception of the kind of careers that are available in the computer culture. Girls also complain that they do not see women in the media who are actively involved in computing. One solution is to use popular girls' media to promote real women doing work using computer technology. The goal of this campaign would be to change the entrenched stereotype of the “computer person” as male and socially isolated.
- **Increase the visibility of women who have taken the lead** in designing and using computer technology. Girls express an interest in seeing such women, who have often not become public figures.
- **Highlight the human, social, and cultural dimensions and applications of computers,** rather than the technical advances, the speed of the machines, or the entrepreneurial culture surrounding them.

To Parents, Students, Educators, Software Designers, and School Districts:

- **Start the conversation about gender in the computer culture.** A more equitable and inclusive computer culture depends on consciousness raising within schools about issues of gender, race, and class. It will be useful to discuss gender differences about computing and the computer culture. This conversation must take seriously girls' and women's valid critiques of computer design, use, and applications.
- **Invite girls into the “tinkering” aspects of computation.** These activities are crucially important for empowering women as designers and builders, not just consumers and end users. Tinkering activities should emphasize the pleasures of experimentation and creative, “artistic” play. Tinkering with code need not be seen as less artistic than tinkering with color, form, and shape. The fact that it is seen as such depends in large part on the way our culture has “constructed” mathematics, science, and computer science as uncreative. This perception can and should be changed. ♦

In order to attract girls and women to computing, we need to broaden the meanings and values associated with technology and technological work.

The Appeal of High-Tech Careers

By Bettina Lankard Brown, ERIC Clearinghouse on Adult, Career, and Vocational Education

Because employment in today's workplace requires increasingly sophisticated technological skills, educators must find ways to recruit and retain all types of students in math, science, and technology courses.

Women and minorities are underrepresented in technology-related careers. Lack of access, low levels of math and science achievement, and emotional and social attitudes about computer capabilities may be some of the factors that cause women and minorities to avoid high-tech careers. According to the American Association of University Women, the number of women graduating in computer sciences and information technology is decreasing despite the increased need for workers in these areas.¹ The Bureau of Labor Statistics reports that only 7.2 percent of all computer scientists are African American and that 2.6 percent are Hispanic.² Because employment in today's workplace requires increasingly sophisticated technological skills, educators must find ways to recruit and retain all types of students in math, science, and technology (MST) courses.

Attracting Women and Minorities

A common reason that young people become attracted to a career field is that the career appeals to their intellect and emotions: They are intellectually aware of the benefits of the work and emotionally committed to the work because of its personal relevance to their lives. Following are four strategies for initiating and sustaining students' intellectual and emotional interest in pursuing a career in technology:

1. **Connect technology to their interests.** Integrating technology into a variety of subject areas—for example, music, history, art, and science—can be a stimulus for learning. It can not only expand students' knowledge of technology concepts, but also engage students in the learning process by including opportunities for problem solving and creative thinking regarding technology use.³ Hands-on applications and reality-based assignments can be highly motivational as they enable students to learn technology in the context of its real-world application.⁴

Designing a curriculum that is attentive and responsive to diverse cultural orientations can also be a motivator when introducing technology. Harrington notes that many African Americans are drawn to careers that offer direct service to their communities—such as education, social work, medicine, law, and religion.⁵ To make technology appealing

to people of all cultures, educators must be able to connect technology-related careers to cultural values.

Gaming can be used to stimulate student interest in technology when the games are free of gender bias and designed to appeal to both sexes. Because games are viewed as “play,” they can engage students in problem solving in a relaxed atmosphere, thus helping students to develop skills without fear of risk taking. Low-threat, high-challenge play and cognitive activities have proved to be motivational influences for learning.

2. **Change Social Attitudes.** According to the National Science Foundation, the percentage of women receiving bachelor's degrees in computer science dropped from 40 percent to 27.5 percent between 1984 and 1996.⁶ One factor contributing to this downturn may be that girls view people who work in technology as having solitary jobs that involve little interaction with other people. To change social attitudes regarding women's needs and abilities regarding technology, El Paso Community College established the Women in Technology (WIT) program. The WIT program offered technical education services for women and engaged in community outreach efforts, which included female mentors from the community. After ten years in operation, female enrollment in technical fields at El Paso Community College has more than doubled.⁷

Some educators feel that schools have unknowingly contributed to the limited enrollment of minorities in classes that would prepare them for high-tech careers. Ramirez, Laurel, and Rodriguez-Aguilar advocate the use of intervention activities in mathematics and science in the elementary and middle grades.⁸ Harrington suggests that career counselors become more open to the technological potential of minorities, ensuring that they do not allow prejudicial thinking to keep them from offering appropriate career guidance.⁹

3. **Involve Business.** Businesses have a vested interest in helping students develop the tech-

Continued p. 11, “High-Tech Careers”

High-Tech Careers . . . continued

nological skills required for work in this century. They need workers who can complete complex tasks by using these skills as well as problem solving and critical thinking. As a result, many businesses are offering incentives to young women and minority students. Intel Corporation, for example, recently established a Computer Clubhouse in cooperation with Boston's Museum of Science and the Massachusetts Institute of Technology Media Lab. In this after-school program, female and minority youngsters meet with adult mentors to learn more about computer technology. "Intel plans to open 100 such clubhouses around the world by 2005."¹⁰ Microsoft Corporation, IBM, and AT&T have demonstrated a commitment to helping Black students become interested in high-tech careers by promising \$101 million in cash and equipment to thirty-nine Black colleges. Initiating the United Negro College Fund drive with this commitment, the three high-tech companies are hoping to close the gap that separates minorities from whites in the high-tech economy.¹¹

4. **Provide Career Information.** "The Occupational Outlook Quarterly, which forecasts employment trends through the year 2005, predicts the demand for computer scientists and systems analysts will grow by 111 percent between 1992 and 2005" (Caruso 1997, p. 6). Jobs in these fields offer great potential for job security and higher salaries. Unfortunately, many female and minority students are unaware of these projections, especially in the job market for computer engineers, systems analysts, and webmasters. Giving students this information is meaningless, however, if it is not accompanied by real-world experiences of observing or talking with people who work in these professions. George K. Williams of TRW Systems & Information Technology Group has been working with the Black Data Processing Associates to help bridge the racial divide. Williams said their most effective strategy involved "going into the schools and sharing our knowledge about computer technology while serving as mentors and role models."¹²

Preparing for High-Tech Careers

The American Electronics Association finds that the total number of degrees awarded in engineering technology declined 16 percent between 1990 and 1996. Of the decreasing number of high-tech

degrees awarded, foreign nationals received 45 percent of the Ph.D.'s and 32 percent of the master's . . . [T]he U.S. educational system is not adequately preparing our youth for today's information age economy.¹³

Following are some steps educators can take to improve their methods for preparing women and minorities for high-tech employment:

1. **Change teaching and learning practices.** Collaborative and cooperative learning environments are effective teaching strategies for technology learning because they promote learning through social interaction with others. They reflect the constructivist learning theory, which contends that true learning occurs as individuals share their knowledge and interact with each other in the social environment of its application. The purpose of learning must extend beyond the classroom and link to everyday life in order for the acquired knowledge to have real meaning to the learner. Collaborative learning practices encourage interdependence and a sense of shared responsibility, as opposed to individual learning, which rewards leadership through dominance.¹⁴
2. **Introduce technology in middle grades.** Educators are recognizing the importance of involving girls and minorities in technologies at an early age, when they are motivated by their own interests and not by stereotypical views of career choices. The Girl Scouts of America shows its support of this view by offering proficiency badges in technology and the Internet for Brownie, Junior, and Senior levels.¹⁵ As at higher levels of schooling, programs at the middle grades should be engaging and interactive. They should be designed to promote creativity, yet provide structure so that students can relate information technology to their lives.¹⁶

The Brownsville Independent School District has experienced success in increased minority participation through its school year and summer programs. Of the district's 40,000 K-12 students, 97 percent are Latinos. Teacher training, curriculum reform, policy analysis, and student activities were introduced "as part of a comprehensive plan to prepare and recruit minority students into the science, mathematics, engineering, and technology pipeline."¹⁷ A five-year study of the program found that student proficiency in science and mathematics increased.¹⁸

Continued p. 12, "High-Tech Careers"

The purpose of learning must extend beyond the classroom and link to everyday life in order for the acquired knowledge to have real meaning to the learner.

High-Tech Careers . . . continued

Research has shown that many of the barriers to science, mathematics, engineering, and technology careers may be overcome by effective school practices.

3. Provide mentors and role models. Providing role models and mentors for female and minority students is another way to increase their interest in technology careers. In a study of twelve women successfully employed in nontraditional, technology-related professions, many reported being “influenced by either an encouraging male figure within their personal sphere, and/or by a teacher in the educational sphere.”¹⁹ Many participants commented that exposure to a strong female “technological role model” played a significant part in their choosing MST career paths. The Department of Mathematics and Computer Science and the Office of Multicultural Affairs at Fontbonne College, in Missouri, matched eight high-risk first- and second-year students with alumni mentors as part of a one-credit career management course. Evaluation of the effort showed improved academic student performance.²⁰

4. Demonstrate a commitment to equity. Schools can facilitate gender equity and leadership development by employing the following policies:²¹

- selecting software free of gender and ethnic bias
- ensuring that computer laboratories are accessible to each gender, ethnic group, and income level, as well as to students with disabilities
- encouraging the incorporation of technology strategies within all sectors of the curriculum
- providing staff training in technology
- periodically reviewing and revising equity policies as necessary

These strategies provide structured norms that emphasize equity in technology usage and foster relationships that help students achieve their career goals.²²

Conclusion

Research has shown that many of the barriers to science, mathematics, engineering, and technology careers may be overcome by effective school practices. Teaching and learning practices, early intervention programs, and mentoring are just some of the ways schools can foster student participation in high-tech programs and careers. Eliminating, or at least reducing, the social and educational factors that have created barriers to high-tech careers can help educators to move new generations of female and minority students into the high-tech careers in which they have been underrepresented. ♦

Reprinted from *ERIC Digest No. 226: Women and Minorities in High-Tech Careers*, ERIC Clearinghouse on Adult, Career, and Vocational Education, 2001, www.ed.gov/databases/ERIC_Digests/ed452367.html.

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WEEA Resources on Technology

Gender, Discourse, and Technology

Research to Action Report

Technology has been a force of continual change during this century, affecting every aspect of our professional and personal lives. Technology use and occupations are hailed as the new frontiers for the coming years. But the role gender plays in the application of technology is very much open to debate. *Gender, Discourse, and Technology* explores the ways that the unconscious message that technology has a "male" persona affects the use of technology in classrooms and the world of work. (33 pp.) • By Katherine Hanson, WEEA Equity Resource Center 1997 #2759 • \$6.00

Spatial Encounters

Exercises in Spatial Awareness

A fun, comprehensive set of exercises to build the spatial orientation and visualization skills needed in math, science, and technology. The exercises also can be fun "rainy day" puzzles. Easy directions simplify classroom and self-directed use. (338 pp.) • By Dr. Peggy Blackwell, University of New Mexico (1982) • #2434 • \$40.00

Lifting the Barriers

600 Strategies That Really Work to Increase Girls' Participation in Science, Mathematics, and Computers

Do the girls in your program need encouragement? Consider the following strategies:

- looking a girl in the eye and telling her, "You're really good at this"
- having girls create a multimedia yearbook
- recruiting the "popular" girls, since others will follow their lead

Teachers found that these strategies caused dramatic changes in their classroom. Girls' enrollment in advanced courses and after-school clubs doubled or even tripled in one year. In one school, girls signed up for physics for the first time in twelve years. This book contains hundreds of teacher-friendly and teacher-tested strategies for successfully involving girls in math, science, and technology. Based on the experiences of 200 K-12 educators from every state in the country, the strategies range from the simple to the complex and from the obvious to the ingenious. (111 pp.) • By Jo Sanders, Gender Equity Program, Center for Advanced Study in Education, City University of New York Graduate Center (1994) • #2809 • \$13.95

**To order
WEEA
materials
call our
distribution
center at
800-793-5076.**

Online Course

Engaging Middle School Girls in Math and Science

Studies show that starting in middle school, girls are less likely than boys to take elective courses in math and science. This decline in participation is especially severe among low-income or disadvantaged girls, girls with learning disabilities, and girls who are learning English as a new language.

Engaging Middle School Girls in Math and Science, an exciting online course developed by the WEEA Equity Resource Center and the New England Comprehensive Assistance Center, brings teachers together to explore how they can make a difference at this critical stage in girls' academic careers. The course is designed so that teachers can build on what they already know about good instructional practice, and work toward developing classrooms that support more equitable learning for boys and girls. Useful for both formal and informal settings, this inexpensive course fits easily into every budget and schedule. Professional development points, undergraduate, and graduate course credit are available.



This online course runs for nine weeks (including a one-week tutorial) and is comparable to a 24-hour course. The course fee is \$80 for an individual; \$60 per person for teams; course credit is an additional \$40. Enrollment is limited to 20 students. Register at the WEEA Equity Resource Center website: www.edc.org/WomensEquity

Join the Conversation

EdEquity—The WEEA Center's Online Discussion Forum

Join EdEquity to keep up on the latest educational equity issues and talk with others working in this area. Take part in EdEquity's quarterly Dialogues with the Experts, an issue-oriented online discussion series featuring distinguished panels of experts who engage forum participants in weeklong conversations around current topics in educational equity. Upcoming dialogues address teachers' issues and the relationship between gender, community service, and service learning. To link to past discussions and view future topics, go to www.edc.org/WomensEquity/service/listserv.htm. For instructions on how to subscribe to EdEquity, see page 16.

Additional Resources

Use the provided contact information to order these materials.

An Assessment of Successful Strategies for Attracting Girls into Science, Engineering and Technology

A Review and Analysis of research papers from GASAT (Gender and Science and Technology) Conference Proceedings

This report is an analysis of 100 research projects, the results of which have been presented at GASAT conferences. They range from university research projects to industry-funded programs and major government intervention schemes, such as the Computer Equity Project in the United States in 1993. The purpose of this report is to bring the findings of these projects to the attention of a broader audience. It aims to distill the strategies that have been most successful in overcoming the barriers to women in science, engineering and technology (SET) and in some cases, those that have not. • Promoting SET for Women, Office of Science and Technology, 1 Victoria Street, London SW1H 0ET • Phone: 020 7215 0052 • www.set4women.gov.uk/set4women/schools/btm.htm

Building Their Future

Girls in Technology Education in Connecticut

This journal examines technology education for girls in middle and high schools to identify discouraging barriers as well as major positive influences helping them remain in technology education. • By Suzanne Silverman and Alice M. Pritchard (1996) • *Journal of Technology Education, JTE* Editor, 144 Smyth Hall, Virginia Tech, Blacksburg, VA 24061-0432 • <http://scholar.lib.vt.edu/ejournals/JTE/jte.html>

Computers, Teachers, Peers

Science Learning Partners

Offering case studies to bring the ideas of students learning science to life, this resource is for teachers, administrators, parents, researchers, and undergraduate and graduate students. The authors show how computers, teachers, and peers can serve as learning partners—helping students build on their ideas and become lifelong science learners. They invite everyone interested in improving science education to build on their experiences, share insights on the internet, and create instruction. See also the Computers, Teachers, Peers website: www.clp.berkeley.edu • By Marcia C. Linn and Sherry Hsi (2000) • Lawrence Erlbaum Associates, Inc., 10 Industrial Avenue, Mahwah, NJ 07430 • 800-9-BOOKS-9 • Fax: 201-760-3735 • Email: orders@erlbaum.com • www.erlbaum.com • ISBN 0-8058-3343-9

Digital Divide

A two-part PBS series that explores how the rapid spread of computer technology is affecting young people across the country, including how the issues play out in education, employment, race, and gender. Materials include an eight-page guide including resources and background information for high school social studies teachers, and an eight-page community leaders guide. Available online at www.pbs.org/digitaldivide/learning.html. Color videos, 1 hour each. • By David Bolt, Studio Miramar. (2000) • Films for the Humanities & Sciences • 800-257-5126 • www.films.com

Digital Divide

Computers and Our Children's Future

The companion book to the *Digital Divide* video series is the first book to critically examine the role that technology plays in widening socioeconomic differences in American society. All of the social divisions explored in the book predate the advent of digital technology. This technology is, however, exacerbating these differences in new and previously unforeseen ways. Addresses four topics central to understanding the divide: race, gender, education, and employment. This book should prove useful to parents, educators, and policymakers regarding the role of technology in the classroom, the workplace, and the home. • By David B. Bolt and Ray A. K. Crawford (2000) • TV Books Inc., 1619 Broadway, New York, NY 10019 • 800-331-3761 • Fax: 212-245-7281 • www.tvbooks.com • ISBN 1575000865

Does Jane Compute?

Preserving Our Daughters' Place in the Cyber Revolution

The author introduces you to real girls staking their claim on the digital frontier, along with the parents and teachers who support them. She shows you how to introduce your own daughters to a world where girls are eager, active computer users who excel and exult in the discoveries that are changing the way we all work and play. • By Roberta Furger (1998) • Warner Books, Time Warner Trade Publishing, 1271 Avenue of the Americas, New York, NY 10020 • Fax: 212-467-1372 • ISBN 0446673110

Futures

Preparing Women for High-Skilled, High-Wage Careers

This interactive teacher training video combines acted vignettes with documentary footage of teachers, students, internship coordinators, and parents. Group discussion questions follow each section. Video, 40 minutes, color, with a *Facilitator's Guide* that highlights the key messages and strategies from the video. • By the Institute for Women in Trades, Technology & Science (IWITTS), 1150 Ballena Blvd, Suite 102, Alameda, CA 94501-3682 • 510-749-0200 • www.iwitts.com

Futures

Preparing Young Women for High Skilled, High Wage Careers PowerPoint Presentation

This PowerPoint presentation, which links to the video and training, is packed full of recruitment and retention strategies for both high schools and community colleges. It includes fact sheets and statistics on the number of women in technology occupations and technology classes, and on the gender wage gap. Discover how interventions have helped to increase female enrollment in tech and science classes. PowerPoint Presentation, 62 Slides. • By the Institute for Women in Trades, Technology & Science (IWITTS), 1150 Ballena Blvd, Suite 102, Alameda, CA 94501-3682 • 510-749-0200 • www.iwitts.com

Continued p. 15, "Additional Resources"

*Additional Resources . . . continued***Gender Equity Right from the Start**
Instructional Activities for Teacher Educators in Mathematics, Science, and Technology

This guide is for professionals and researchers involved in curriculum, instruction, educational administration, and leadership, educational foundations; studies in gender equity; and teacher education. A practical guide, for use by professors of education for pre-service teachers and by staff developers for in-service teachers. • By Jo Sanders, Janice Koch, and Josephine Urso (1997) • Lawrence Erlbaum Assoc., 10 Industrial Avenue, Mahwah, NJ 07430-2262 • 800-9-BOOKS-9 • Fax: 201-236-0072 • Email: orders@erlbaum.com • www.erlbaum.com • ISBN 0-8058-2337-9

IDEAAAS**Sourcebook for Science, Mathematics and Technology Education**

IDEAAAS is an extensive compendium of more than 1,000 organizations and the 10,000 resources and programs they offer. Listings contain contact names, address information, fax numbers, and email addresses. • By Barbara Walthall (ed.) (1995) • The Learning Team, 84 Business Park Drive, Armonk, NY 1050 • 800-793-TEAM • www.learningteam.com • ISBN 0-87168-545-0

The Internet for Girls:**Connecting Girls with Math, Science and Technology**

Parents and teachers need to be aware of why the interests and needs of girls may be different from those of boys in learning about technology and science, and how the Internet can be used to encourage girls to develop their interests. Teachers can use the resources here to develop learning strategies and lesson plans. Parents can use these resources to help their daughter in her education and support her plans for a future career, or just to enjoy exploring the Internet with their daughter. • Donna Woodka (2000) • Unpublished, available on the Internet • www.sdsc.edu/~woodka/

Land of Plenty**Diversity as America's Competitive Edge in Science, Engineering, and Technology**

Land of Plenty is a report by the Commission on the Advancement of Women and Minorities in Science, Engineering, and Technology Development, which was mandated in 1998 to research and recommend ways to improve the "recruitment, retention, and representation of women, underrepresented minorities, and people with disabilities in science, engineering, and technology (SET) education and employment." The commission's research has reaffirmed the economic and social imperative that all U.S. citizens fully participate at all levels of SET education and work. • By the Commission on the Advancement of Women and Minorities in Science, Engineering, and Technology Development (1998) • National Science Foundation, 4201 Wilson Boulevard, Suite 1280, Arlington, VA 22230 • 703-292-8095 • Fax: 703-292-9267 • www.nsf.gov/od/cawmset/report/cawmset_report.pdf

The Neuter Computer: Computers for Girls and Boys

The explosion of computer use in homes and schools has revealed a disturbing trend: more boys than girls use computers. *The Neuter Computer* was developed from the

Computer Equity Training Project at the Women's Action Alliance to boost girls' interest and give the women of tomorrow opportunities when entering the job market. Girls' computer use increased 144 percent due to the strategies presented here. This book includes 56 activities to use at home or in the classroom, and 96 strategies for computer equity. • By Jo Schuchat Sanders and Antonia Stone for the Women's Action Alliance • Neal-Schuman Publishers, New York, NY • ISBN 1-55570-006-3

Technology Education in the Classroom
Understanding the Designed World

This book presents a vision of a K-12 technology education program and what it might achieve for America's schools. It explains how to construct a series of multi-year courses or course sequences that give students direct experience in designing products, structures, and systems to meet individual and social needs. It includes classroom vignettes and specific examples of the ideas being discussed, which make the materials accessible to a wide audience—from teachers to policymakers. • By Senta A. Raizen, Peter Sellwood, Ron Todd, and Margaret Vickers (1995) • Jossey-Bass, 350 Sansome Street, San Francisco, CA 94104 • 415-433-1740 • Fax: 415-433-0499 • www.josseybass.com • ISBN 0-7879-0178-4

Technology in K-12 Schools—What Are the Equity Issues?

This publication summarizes the current state of research pertaining to the above question and is intended as a guide for administrative decisions as well as a call for further research and analysis. Educators must consider what policies and practices they can adopt in the interim to ensure that students of all races and backgrounds are receiving access to technology in a way that benefits their education. Available online. • By the Mid-Atlantic Equity Consortium (Fall/Winter 1999) • MAEC, 5454 Wisconsin Avenue, Suite 655, Chevy Chase, Maryland 20815 • 301-657-7741 • Fax: 301-657-8782 • www.maec.org/publist.html

Tech-Savvy**Educating Girls in the New Computer Age**

Explores girls' and teachers' perspectives of today's computer culture and technology use at school, home, and the workplace. Presents recommendations for broadening access to computers for girls and others who don't fit the "male hacker/computer geek" stereotype. • By the American Association of University Women (2000) • American Association of University Women Educational Foundation, 1111 16th Street NW, Washington, DC 20036 • 202-785-7700 • Fax: 202-872-1425 • www.aauw.org • Item #N28

Women and Minorities in High-Tech Careers

Despite an increased need for workers in computer science and information technology, the number of women graduating in these areas is decreasing. Presents a number of ways that teachers can attract women and minorities into high-tech fields, focusing on the importance of attracting and retaining in science, math, and technology classes in school, where students learn the essential skills to enter the high-tech workplace. • By Bettina Lankard Brown (2001) • ERIC Digest no. 226 • <http://ericacve.org>

Use the provided contact information to order these materials.

WEEA Resources and Services

For resources and assistance call the WEEA Center at 800-225-3088.

Practical Tools and Support for Gender-Fair Learning

The WEEA Equity Resource Center at EDC can help you find the tools you need to create gender-fair multicultural learning environments.

Call the center's hotline at **800-225-3088** or **TTY 800-354-6798** for resources and referrals.

The center's website is full of exciting information and tools, from fun facts about the history of equality to a list of practical curricula designed to help make any subject gender-fair. The center's website was designed to be accessible to users with disabilities.

www.edc.org/WomensEquity

EDEQUITY (the Educational Equity Discussion List) is designed to support practitioners and engage them in discussion about educational theory and practice. To subscribe, send e-mail to <Majordomo@mail.edc.org>. The subject should be left blank and the body of the message should read:

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The WEEA Equity Resource Center, a project of Education Development Center, Inc. (EDC), is funded by the U.S. Department of Education's Women's Educational Equity Act Program to promote gender equitable education for all students. The WEEA Center offers products, services, and referrals to schools, school boards, colleges and universities, community organizations, businesses, parents, and students throughout the country. These practical tools include curricula, books, working papers, digests, and online courses that support equity and excellence regardless of gender, race, ethnicity, class, language, and disability.

WEEA Catalog

Our catalog lists over 100 products that offer concrete ways to implement gender equitable education in classrooms, from preschool to college, and in adult education. Whether you are beginning the process or are an experienced gender equity specialist, we specialize in resources that help you understand the current issues in gender equity and how these relate to your classroom or workplace. Call the center for a free copy (800-225-3088).

Technical Assistance

We have a staff that includes a team of technical assistance specialists available to answer questions regarding issues on gender equity, disability, race, ethnicity, and class, suggest materials, make referrals, and locate speakers for conferences or activities. Contact us to ask questions.

"WEEA Resources" listed on page 13

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WEEA is the Women's Educational Equity Act: federal legislation to promote educational equity for girls and women.

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