

Testimony for the hearing on Women in Science and Technology
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Thank you, Mr. Chairman and members of the Subcommittee for the opportunity to testify about encouraging girls and women in science and technology. My name is Nancy Stueber and I am the President of the Oregon Museum of Science and Industry (OMSI), an interactive science and technology center in Portland, OR. I am a biologist by training, who realized that one way to truly affect change is through education, and so have spent my career working to make science and technology accessible and relevant to people of all ages. Half of those people are female.

Recent statistics of the number of women in the workforce in science and engineering careers reveals a shocking fact. Women comprise only 22% of the science and engineering workforce,¹ and for women of color, the picture is even more bleak. As a society we have unprecedented scientific knowledge and more technological tools available than ever before. As a species, we are also having an unprecedented impact on natural systems and are facing new challenges of how to live sustainably on the planet. At the same time, professions that rely on math, science and technology cannot find enough skilled workers. Science education and technological innovation are keys to both our country's economic competitiveness and to our ability to meet the challenges of the complex world we live in. We need to tap into all of the talent available, from girls as well as boys, if we are to continue to be a world leader in scientific innovation.

To understand why girls are so badly underrepresented in science and technology at the college level, we need to look back much earlier. If you spend time in a kindergarten classroom, you will find that girls and boys are equally interested or talented in science, math, or technology. The Girls FIRST² project, funded by the National Science Foundation, provides a vivid example of how those attitudes change. Their observations in a kindergarten class showed that the kindergarten girls spoke out in class, got involved in hands-on projects, and drew pictures of themselves in an imagined future as doctors, archaeologists, and marine biologists. When the same girls were observed in fourth grade, they showed a marked change. They were more reluctant to speak up in a group and voice their opinions. They no longer saw themselves as future scientists. They had lost confidence and direction. Research indicates that between fifth and seventh grade, most girls have decided whether or not science and math are useful for them.

How can we change that trend? To be successful, we must consider two factors that influence

¹ *Women, Minorities, and Persons with Disabilities in Science and Engineering*: 1998, NSF 99-338. National Science Foundation, Arlington, VA, 1999.

² Kekelis, L and E. Heber. 2001. *Girls FIRST, A Guide to Starting Science Clubs for Girls*. Oakland CA: Chabot Space & Science Center.

girls' choices: **experience** and **expectation**. We must provide girls access to rich science learning **experiences**. We must provide toys and activities that enhance problem-solving skills. Science centers, after school clubs, and enrichment classes all provide enhancement activities for girls. A girl in one of the Girls FIRST clubs said how much she enjoyed building with LEGOs. When asked if she had LEGOs at home, she answered that she had never owned a set of her own. Her parents bought LEGOs for her brother. Once he got tired of playing with them, the LEGO set was given away. These parents had never considered that their daughter might enjoy a construction set just as much, or perhaps even more, than their son. In the after-school clubs and classes at OMSI, we offer girls the same opportunity as boys to work with LEGOs, construction sets, science kits and computers. But we also make those activities relevant to the girl's lives. For example, we found many boys, but few girls, interested in a recent engineering challenge to build a radio tower that could withstand a simulated earthquake. When we switched the challenge to the design of an earthquake-proof room, the girls suddenly wanted to participate. The application was something they could relate to. As they gain experience with successful problem solving, they gain confidence and a willingness to experiment that translates to a head start in school.

The **expectations** we set are equally important. Most girls have had less encouragement than boys to engage in activities that are likely to inspire their interest in science and technology. They are often not expected to do well, and many times are not advised to take advanced classes in physics or engineering. Connie Durst excelled in biology. But when she told her counselor that she wanted to be an engineer, she was advised against it. The counselor told her that engineering would require advanced mathematics and he didn't want her to be disappointed when she couldn't do it. That was the challenge that made Connie determined to prove him wrong and today she is an accomplished engineer doing cutting-edge research in hazardous waste clean-up. Many girls do not have the self-confidence to overcome discouragement from mentors. And unfortunately, when most girls opt out of science or technology, it is unlikely that anyone—parents, teachers, counselors, or peers—will notice or intervene.

Girls will live up to the expectations we set for them. They need teachers trained in gender equity issues and female mentors and role models. OMSI hosts a club for Hispanic girls called Latinas en Ciencia, or Girls in Science, funded by the National Science Foundation. We specifically targeted Latinas because the Latino population has the highest school drop-out rate in Oregon, and girls comprise the highest percentage of those drop-outs. At the start of the session, we asked the girls to draw a picture of a scientist. I have an example of a drawing by Felicia, depicting a white male in a lab coat. At the end of the program, after weeks of science experiments led by women scientists, the girls were given the same exercise. This time Felicia's scientist was a woman with a big smile. When asked the most important thing that she learned she responded "that being a scientist is really fun." When asked how we could make the experience better she said "that we could have science every day." The highly successful, NSF-funded AWSEM program (AWSEM stands for Advancing Women in Science Engineering and Mathematics) has demonstrated success in pairing girls with women scientists as mentors. Erica Ritter, a young chemist on my staff, is writing a book called "Geek Chic" for

adolescent girls who are facing negative peer pressure because of their interest in science and technology.

There are many other examples of successful programs. But there are not enough. We must work at every level to educate parents, teachers, and the girls themselves about the frequently unintentional practices that bias girls against science. And we must start early. We will see a change in the number of women in technology-based careers only if we invest in the experiences and expectations for girls in their early years.

I applaud the subcommittee for addressing these issues and for your support of education initiatives at NASA and the National Science Foundation that support the work of community organizations best able to reach girls in the early years. Women represent a huge resource that we cannot afford to leave untapped. We are committed to working with you to meet the challenge of increasing the number of women entering scientific and mathematical professions.

Thank you, Mr. Chairman, for this opportunity to testify. I will be pleased to respond to any questions that you or members of the Subcommittee might have.