

Jumpstarting Jill



Strategies to Nurture Talented Girls in Your Science Classroom

by Nancy N. Heilbronner

As a teacher, you've probably had that one moment when everything that you were doing—your lesson plans, your approach with students, your ideas about teaching—crystallized and you realized it was all . . . wrong. For me, that moment came when I began teaching a group of talented middle school science students and met Jill.

Jill was the dream child. You know the type—you tell her parents at conferences, “I wish I had 20 more like her,” and you mean it. Sixth grader Jill came dutifully into class each day, her pencils sharpened, an expectant look on her face, her completed homework and straight-A report card neatly tucked into the pocket of her color-coded 3-ring binder. She was ready to learn science, or so I thought. Then one day, Jill and her friend hurried out of class and I caught her whispered comment, “Boy, I thought that class would never end. I hate science!” Crushed, I wondered what had gone wrong. How could such a bright girl hate my class? I was forced to take a look at what I had been doing.

If you're going to survive and grow as a teacher, you must undergo scrupulous regular self-examination and barebones honesty. If I were completely honest with myself, I would have to say that while the boys in my class were excited and interested in science, many of the girls were demonstrably less so. They remained in the shadows, letting the boys run the labs and then performing the “grunt” work of writing the lab reports and cleaning up. What was happening in my classroom?

Is Gender Equity Still a Problem?

When talented girls like Jill grow up, they don't necessarily achieve at the highest levels of most professions. This is surprising, for women are achieving academically at rates equal to, or exceeding men in many areas. For example, Halpern et al. (2007) reported that in 2004 women earned 58% of all bachelor's degrees in the U.S., and 59% of all master's degrees. In certain science, technology, engineering, and math (STEM) fields, women are well-represented, or even overrepresented, with women earning 78% of undergraduate degrees in psychology, 62% of biology degrees, and 51% of chemistry degrees (Halpern et al., 2007; National Science Foundation, 2006a). However, women still score lower than men on the math portion of the SAT (College Board, 2006), and in other STEM areas women earned fewer science undergraduate degrees than men in the U.S. In 2004, women earned 46% of the undergraduate degrees in math, 25% of computer science degrees, 22% of physics degrees, and 21% of engineering undergraduate degrees (Halpern et al., 2007; National Science Foundation, 2006b).

These findings are paralleled at the doctoral level, where in 2004 women earned less than 33% of all doctoral degrees in chemistry, computer sciences, math, physics, and engineering (Halpern et al., 2007; National Science Foundation, 2006b). In the social sciences, women represent 35.7% of faculty, in natural sciences, 22.9% of faculty, and in engineering, only 9.5% of faculty (Forest Cataldi, Fahimi, & Brandburn, 2005). This lack of representation by women in certain STEM fields also extends to the workforce. Women represent half

of the workforce, yet they represent only 26% of the science and engineering workforce (Halpern et al., 2007; National Science Foundation, 2006c).

Today's teachers who work with talented girls in math and science must still concern themselves with strategies that promote the development of girls' talent in all STEM areas. What specific actions can we take to promote talented girls in science, and also to encourage them, if they are interested, to enter underrepresented areas?

Strategies to Nurture Abilities in Middle School Girls

The Institute of Education Sciences recently published an informative and helpful set of teacher guidelines, *Encouraging Girls in Math and Science: IES Practice Guide* (Halpern et al., 2007), outlining five research-based recommendations for raising girls' interest and achievement in science. These recommendations provide a helpful framework for delineating real, tried and true classroom strategies—strategies that, based upon my experiences as I struggled to improve my classroom, proved to be highly effective at motivating tomorrow's young female scientists. A summary of these strategies and a list of Internet resources for further exploration are provided in Table 1, and each IES recommendation is discussed below.

IES Recommendation 1: Teach Students That Academic Abilities Are Expandable and Improvable

Students who believe that academic abilities are fixed may be at risk for a decline in achievement when

the going gets tough. On the other hand, students who believe that academic abilities may be improved may continue to try to achieve (Dweck, 2007). What can we do to help our talented girls understand that the way they perform today may not be the way they will perform forever, or that it's possible to improve?

One particularly effective strategy may be to expose students to new research about cognitive neuroscience (Halpern et al., 2007), evidence that suggests that it is possible to develop intelligence. Talk with your students about this new research, and expose them to the idea that academic abilities can be developed.

Bibliotherapy has been demonstrated to be an effective strategy to use with students when trying to communicate with children (Calhoun, 1987) and can be used to make a point. Read biographies with your students about famous individuals, particularly women, who obviously continued to develop their abilities as they aged and achieved at higher levels. Examples of some of these women might include Maya Angelou, Marie Curie, and more.

IES Recommendation 2: Provide Prescriptive, Informational Feedback

Not all praise is equal. General praise consists of statements that are nonspecific, such as "Good job!" and "You're so smart!" Prescriptive, informational feedback consists of statements relating to the strategies, effort, and process of learning. For example, if a teacher says to a student, "The way you expressed your hypothesis shows that you really understand the nature of the problem," that student has learned much more than if the teacher had simply said, "Way to

Table 1
Recommendations, Strategies, and Resources
to Promote Science Abilities of Talented Females in the Classroom

Recommendation/Strategy	Resources
IES Recommendation 1: Teach Students That Academic Abilities Are Expandable And Improvable.	
<ul style="list-style-type: none"> Present research to students that documents that ability is malleable. 	Developing Intelligence: A Listmania List http://www.amazon.com/Developing-Intelligence/lm/R54U45KC5OFVA How Can Students Develop Students' Motivation—and Success? An Interview With Carol Dweck http://www.educationworld.com/a_issues/chat/chat010.shtml
<ul style="list-style-type: none"> Read biographies of individuals who improved their abilities. 	Distinguished Women of Past and Present http://www.distinguishedwomen.com Biographies of Notable Women http://womenshistory.about.com/library/bio/blbio_list.htm
IES Recommendation 2: Provide Prescriptive, Informational Feedback.	
<ul style="list-style-type: none"> Be specific in praise and feedback. 	Effective Praise http://www.kellybear.com/TeacherArticles/TeacherTip37.html Words of Wisdom activity (see article for description) Well Done! Board documenting students' successes with a camera (see article for description)
IES Recommendation 3: Expose Girls to Female Role Models Who Have Succeeded in Math and Science.	
<ul style="list-style-type: none"> Contact local community organizations to promote the development of female speakers and mentors. 	<i>TryScience</i> Online Guide to Science Resources in Your Community http://www.tryscience.org/parents/se_2.html
<ul style="list-style-type: none"> Investigate and utilize nationwide mentoring and networking organizations. 	Organizations Supporting & Encouraging Girls in Science http://cshe.berkeley.edu/events/womenscience2001/organizations.htm
<ul style="list-style-type: none"> Share stories of strong women. 	Girl Power! Strong Girls, Strong Women: Books Featuring Strong Females http://www.education.uiowa.edu/crl/bibliographies/documents/StrongGirls1.07.pdf
IES Recommendation 4:	
Create a Classroom Environment That Sparks Initial Curiosity and Fosters Long-Term Interest in Math and Science.	
<ul style="list-style-type: none"> Get to know your female students' interests. 	If I Ran the School: A Primary Interest Inventory (Burns & Siegle, 1996); Primary Interest-A-Lyzer (Renzulli & Rizza, 1997); and Secondary Interest-A-Lyzer (Hébert, Sorensen, & Renzulli, 1997) http://www.gifted.uconn.edu/siegle/Conferences/Wings/InterestAssessmentSwitzerland.pdf Student Interest Survey http://ibox.union.k12.sc.us/ems/Teachers-Forms--Student%20Interest%20Survey.htm Google Groups—Communication Forums With Students http://groups.google.com
<ul style="list-style-type: none"> Promote female student interests. 	Classroom Jobs: Teacher-Tested Tips http://atozteacherstuff.com/Tips/Classroom_Jobs The Adventures of Josie True http://www.josietrue.com
<ul style="list-style-type: none"> Encourage risk-taking by providing some ungraded assignments. 	Rubrics for Teachers http://www.rubrics4teachers.com
<ul style="list-style-type: none"> Read and share stories about women who took risks. 	"Using Biography to Counsel Gifted Young Women" (Hébert, Long, & Speirs Neumeister, 2005) http://www.prufrack.com/client/client_pages/GCT_Readers/Gifted_Girls/Ch._6/Counseling_Gifted_Girls.cfm

Recommendation/Strategy	Resources
<ul style="list-style-type: none"> Use gentle humor to defuse situations in which the student may feel threatened. 	<p>“Ten Specific Techniques for Developing Humor in the Classroom” (Weaver & Cotrell, 2001) http://www.faculty.armstrong.edu/roundtable/4717458.pdf</p>
<ul style="list-style-type: none"> Teach appropriate goal-setting strategies. 	<p>Adolescent Goal-Setting Strategies: 5 Steps to Successful Achievement With Middle Schoolers http://middle-school-life.suite101.com/article.cfm/adolescent_goal_setting_strategies</p>
<ul style="list-style-type: none"> Provide learning contracts to narrow choices. 	<p>Best Practices: Instructional Strategies and Techniques: Learning Contracts: http://www.saskschools.ca/curr_content/bestpractice/contract/index.html</p>
<ul style="list-style-type: none"> Help overachievers understand about focus and selective achievement. 	<p>“Underachievement Versus Selective Achievement: Delving Deeper and Discovering The Difference” (Speirs Neumeister & Hébert, 2003)</p>
<ul style="list-style-type: none"> Identify students’ strengths, interests, and learning styles to help them focus on goals. 	<p>Student Learning—Strengths Inventory http://www.education-world.com/a_lesson/03/lp319-01.shtml Renzulli Learning System http://www.renzullilearning.com</p>
<ul style="list-style-type: none"> Encourage participation in classroom activities. 	<p>Gender-Fair Teaching Is Good Teaching http://www.as.wvu.edu/cwc/genderfair.htm</p>
<ul style="list-style-type: none"> Broaden instructional strategies to include a wealth of nonthreatening response modes. 	<p>Instructional Strategies Online http://olc.spsd.sk.ca/DE/PD/instr/categ.html</p>
<ul style="list-style-type: none"> Assign cooperative group roles. 	<p>Laura Candler’s Cooperative Learning File Cabinet http://home.att.net/~clnetwork/clfiles.htm</p>
<ul style="list-style-type: none"> Connect with your students. 	<p>“About Me” bulletin board for the teacher</p>
<ul style="list-style-type: none"> Develop artistic modifications that will allow girls to take an interest in the subject and in you personally. 	<p>Use finger puppets, songs, and costumes in the classroom; share a personal experience; share family items; and so forth Painting Yourself Into the Professional Growth Picture—Artistic Modification http://www.gifted.uconn.edu/sem/paintyou.html</p>
<ul style="list-style-type: none"> Start a girls’ science group that meets before or after school or during lunch. 	<p>Science, Gender, and After-School Resources http://www.afterschool.org/home</p>
<ul style="list-style-type: none"> Provide equal access to technology. 	<p>“Promoting Gender Equity in the Information Technology Classroom” (Chalmers & Price, 2000) http://www.acce.edu.au/journal/journals/vol15_1.pdf</p>
<p>IES Recommendation 5: Provide Spatial Skills Training.</p>	
<ul style="list-style-type: none"> Incorporate spatial learning activities into your classroom. 	<p>IMAGES Instructional Activities http://images.rbs.org/activities_plans/activities.shtml</p>
<ul style="list-style-type: none"> Involve students with WebQuests that require sophisticated spatial skills. 	<p>WebQuest.org http://www.webquest.org</p>
<ul style="list-style-type: none"> Maintain an area of your classroom that contains manipulatives designed to enhance spatial skills. 	<p>Google Listing of Science and Math Educational Manipulatives http://www.google.com/Top/Reference/Education/Products_and_Services/Equipment_and_Supplies/Manipulatives</p>
<ul style="list-style-type: none"> Involve students with sophisticated activities requiring 3-dimensional spatial skills. 	<p>Geocaching http://www.geocaching.com “Educaching: Capturing the Spirit of the Hunt for Learning” (Dobyns, Dobyns, & Connell, 2007) http://www.nagc.org/uploadedFiles/THP/THP_Issues/THP2007WinterIssue.pdf</p>

Note. All Internet resources in the table may be accessed at <http://www.heilbronner.homestead.com> (under Resources, click the Jumpstarting Jill—Table of Resources link).

go!” Research suggests that prescriptive informational feedback promotes student learning and positive beliefs about their abilities (Mueller & Dweck, 1998). How can teachers nurture confidence in their female students by providing specific, informational feedback?

One strategy for providing this type of feedback is an activity called Words of Wisdom. In this activity, ask each student to write down the names of their classmates, with each name on a separate strip of paper. Next, ask the students to write beside each name a specific talent or strength of the individual. For example, students might write “good writer,” “capable artist,” or “good at helping others.” Sort the strips by student name, and then distribute them. With peer input, each student may come to have a realistic view of her strengths. One word of warning: Preview the strips before you give them out to avoid inappropriate comments.

In the classroom, start to document girls’ (and boys’) successes with a camera. How about having a Well Done! bulletin board filled with pictures of students caught in the act of being successful? Post each picture accompanied by a caption that documents *specifically* what the student did well, or post with parental permission on a classroom Web site.

IES Recommendation 3: Expose Girls to Female Role Models Who Have Succeeded in Math and Science

Mentors may be particularly important to talent recruitment and retention in the sciences. Influential mentors may come in the role of parents or high school teachers (Reis & Graham, 2005; Tillberg & Cohoon, 2005), college professors (Downing,

Crosby, & Blake-Beard, 2005; Gavin, 1996), or even older peers (Reis & Graham, 2005). Mentors may offer protégées unique visions of themselves, motivate them to grow professionally, show them new ways to be, and act as spiritual supports, all of which may be particularly important if students lack parental guidance (Hardcastle, 1988). They may help students select a science major (Gavin, 1996), and later may increase productivity, for influential mentors may enable a protégée to obtain grant funding and publish (Steiner, Lanphear, Curtis, & Vu, 2002).

How can classroom teachers encourage the development of mentor relationships for talented girls? It’s a matter of connection. Contact local organizations to invite female speakers from different scientific fields into your classroom. Some community groups are organized for the purpose of providing mentors to at-risk or promising students. Local hospitals, colleges or universities, and laboratories also provide valuable resources for these contacts. Don’t overlook your school district either—send an e-mail to faculty members asking them if family members or acquaintances might be involved in the sciences. Often these individuals are more than happy to mentor children. Similarly, older community members may be pleased to be asked to mentor, and they often possess a wealth of caring and insight for talented youngsters.

IES Recommendation 4: Create a Classroom Environment That Sparks Initial Curiosity and Fosters Long-Term Interest in Math and Science

Know your students and your students’ interests. We know that students enter our classrooms with a plethora

of hobbies and interests, and so the wise teacher takes time to get to know her students outside the classroom to connect with them. One particularly effective strategy for getting to know your students is a classroom Ask Me Mailbox. Turning an old cardboard box or even a real mailbox into a depository for written communication allows students to communicate information about their hobbies, areas of potential study, their concerns, and more. One elementary school science teacher was surprised when she placed the box in her classroom and within 3 days had received more than 100 notes—some questions about homework, as well as some notes expressing interest in a variety of topics. Another approach might be to set up a Google Group where students can communicate online with the teacher and other students in the classroom.

Some teachers have used surveys to uncover student interests, and hundreds of these exist on the Internet. One widely used instrument is the Interest-A-Lyzer (Burns & Siegle, 1996; Hébert, Sorensen, & Renzulli, 1997; Renzulli & Rizza, 1997), which asks creative, targeted questions designed to discover children’s interests.

Encourage any interest that you uncover as you get to know your female students, for these may become lifelong passions. For example, the student who loves biology might be placed in charge of the well-being of the class hamster. As she becomes involved with the task, encourage her to research how to properly care for the hamster to increase its longevity. Real-world, purposeful learning can be a powerful motivator for student productivity (Renzulli & Reis, 1994).

Include examples and activities that incorporate girls’ interests in your teaching. For example, if you are

a middle school science teacher and sense that many girls in your classroom are interested in animals and/or animal rights, try conducting a debate on whether or not animals should be used in research, and watch them come to life!

Encourage risk-taking. Research suggests that as talented girls enter middle school, they are less inclined to take risks in the classroom, and may go underground, hiding their abilities and experiencing a decline in self-esteem and confidence (Dweck, 2007). Perfectionism may play a role as well in that a little perfectionism may be good for a student, but paralyzing perfectionism makes it difficult for a student to accomplish an assignment because she may be too afraid of making a mistake, and therefore may begin to procrastinate (Flett, Blankstein, Hewitt, & Koledin, 1992).

To encourage your students to learn safe risk-taking, you must establish a nonthreatening environment. Try giving some ungraded assignments—students may be more likely to take risks if their grade isn't always riding on it. Share stories with your students, but especially with your girls, about women such as Amelia Earhart and Jane Goodall who took risks. Use kind, gentle humor to defuse a situation if they do “mess up” and teach them that it's okay to fail occasionally. Share your own stories of success and failure with them—they need to hear that adults fail many times, and often go on to succeed. Also, teach *how to fail* successfully by modeling good internal dialogue: “Okay, I didn't do as well on that as I had hoped. The reasons were . . . Next time I can try . . .”

Research suggests female students' achievement may be lowered when interacting with male students (Dweck, 2007), a condition known as *stereotype threat*. Eventually, girls

may come to view themselves as less capable than boys in these academic domains (Steele, James, & Barnett, 2002). Emphasize with the girls in your class that there is no evidence that girls perform more poorly at science than do boys. Also, try using some same-sex cooperative groups in your science classroom to give girls an opportunity to experience the joy of interacting with science without having to deal with gender pressures.

Teach goal setting. Children's beliefs about whether and how they learn may contribute to academic achievement (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996). Specifically, personal goal-setting has been demonstrated to be correlated with academic success (Zimmerman, Bandura, & Martinez-Pons, 1992), and so some girls may fail because they are always setting goals that are too large and out-of-reach. Teach your students how to break down large goals into more realistic, manageable steps. If they can't decide on an open-ended assignment, offer several structured choices. A “menu” or “contract” works well here.

It's also important to teach girls about *selective achievement* vs. *underachievement*. Underachievement means that one is not living up to his or her potential, whereas selective achievement refers to the idea that one cannot give 100% effort all of the time *to everything*, and therefore is required to select or target areas for improvement (Speirs Neumeister & Hébert, 2003). As busy adults, we practice selective achievement, for we have learned to allocate our time, giving more time or attention to activities that play into our strengths. We selectively achieve as a way to focus our energies. It is therefore helpful to empower girls by enabling

them to identify their strengths. A self-awareness of their own learning styles, interests, and abilities help students focus their energies on appropriate goals.

Bring them out of the shadows. Later elementary and early middle school females may start to participate less in classroom activities than their male counterparts, going underground, or into the shadows (Jovanovic & King, 1998), possibly either to avoid calling attention to themselves or to avoid making a mistake. By creating a

Share your own stories of success and failure with them they need to hear that adults fail many times, and often go on to succeed.

gender-sensitive, safe, nurturing classroom, you can encourage talented girls to speak out and realize they have something of value to share.

The first step to bringing your female students out of the shadows is to get them to speak up in class. Having a classroom system to ensure that girls, as well as boys, are called on is helpful, and some teachers simply alternate: call on a girl, call on a boy. Others use a jar of walnuts, with a student's name written on each walnut, a technique that seems to work well for elementary teachers. Middle school teachers may prefer strips of paper with names in containers sorted by periods. Either way, this method ensures that each student gets to answer in class, not only the outspoken ones.

Any strategy that takes the intense spotlight of the entire classroom's stare off the responding student may

help as well. Consider more think-pair-sharing activities where each student shares her answer with a partner or a small group rather than with the whole class. Chain-write, a strategy where a question is posed on a piece of paper and each student writes a response and passes it to another student, who adds to the chain, also may be useful at times.

Cooperative learning groups are of particular concern in the science classroom. Often, girls in the group will gather the lab materials, write the lab report, and clean up after the activity, while the boys do the “fun stuff.” Assigning and rotating group roles such as Materials Manager, Report Manager, Custodial Manager, and Director may help ensure equity.

Connect with students. Another important consideration involves letting your students, and especially your girls, get to know *you* as a person. One effective teacher used an “About Me” board, where she posted pictures of her family and memorabilia from her past, such as her diploma, a science fair award, photos from her trip to China, and more. Students were intrigued and motivated to get to know her as a person.

Research suggests teachers who show a passion for their subject and who connect with students on a personal level may have more success with girls in their classrooms (Gavin, 1996; Klein, 1985; McDaniel, 1994), so don't be afraid to let your personality show through. One successful teacher brought in finger puppets of famous scientists and used them . . . in middle school! Although others warned her that the students would ridicule this type of prop at this age, her students loved it, and loved her for doing it. She often pulled them out to illustrate some point related to the topic, enchanting the students with

lively debates between Einstein and Newton. These *artistic modifications* (Renzulli, 1988, 2002) can go a long way toward not only helping your students to connect with you, but also in encouraging girls in your classroom to see that it's okay to “let their hair down” and play with the romance of the discipline. Find what works for you—it may not be finger puppets—and watch your students, especially your female students, come alive.

Finally, girls' groups that meet after-hours or during lunch are a prime way for caring instructors to foster a relationship with girls. Numerous problems can be contemplated and perhaps solved over pizza and soda!

Provide equal access to technology. Research suggests that as early as preschool, boys interact more frequently with computers than do girls, and that the cumulative effects of this inequity add up over the years (Nelson & Watson, 1991). Girls may come to believe that computers are meant for boys, especially when certain classroom practices such as the lack of computer-savvy female role models and gender-insensitive content discourage girls from accessing and using computers (Schofield, 1995).

A variety of classroom strategies may be implemented to promote the development of computer skills and healthy attitudes toward technology in talented girls. Strive to show models of competent females using computers, and ask girls in the class to introduce software to their classmates. Enable computer time to be social, assigning several students to the computer at a time, and select software with strong female characters in leadership roles, and in which the elements of competitiveness and cooperation are balanced. Make sure the content and style of the program appeal to girls as well as boys, and of course, develop

strategies to provide equal access for boys and girls (Chalmers & Price, 2000).

IES Recommendation 5: Provide Spatial Skills Training

Research supports the idea that boys outperform girls on test items and activities requiring certain types of spatial abilities such as mental rotation, or the ability to rotate a 3-dimensional object on a 2-dimensional plane (Kimura, 2004; Lubinski & Benbow, 2001). Not only are these spatial items included on college entrance examinations such as the SAT-M, but also this type of skill is key to the engineering field, and so its mastery may improve the likelihood of equal female representation in this underrepresented field. The good news is that it may be possible to improve children's spatial skills with training (Marulis, Liu, Warren, Uttal, & Newcombe, 2007), therefore science teachers may play an integral part in helping young women overcome this hurdle.

Certain toys such as LEGOs and puzzles enforce practice with spatial abilities, so include them in your classroom. You may keep these in a corner of the classroom and allow students to use them during free time. Students also often enjoy more complicated puzzles such as those with 3-D elements that are more difficult to complete.

Give assignments that require spatial skills such as mental rotation, spatial perspective, and embedded figures (Sorby & Baartmans, 2000). WebQuests are useful here, especially if they require the student to navigate through a simulated environment using a map or other device (Wood, Quitadamo, DePaepe, & Loverro, 2007). Another fascinating activity is geocaching, which utilizes global

positioning system (GPS) devices to involve students in a global hunt for hidden treasure, or *caches*, set up all over the world. Educaching, developed by Dr. Sally Dobyns of the University of Louisiana at Lafayette, is the educational application of geocaching (Dobyns, Dobyns, & Connell, 2007).

Benefits

Fast-forward in that time machine all science teachers have, and enter my classroom 5 years later, a place very different than when I first began. I scan the room, listening to the quiet hum of students engaged in a variety of activities, and I see evidence of gender-based teaching. Take a tour of my classroom and we'll look for some of those strategies together.

Some girls in my classroom are actively and happily engaged in pairs at the computer center, working on a new science WebQuest about women scientists (access to technology, exposure to role-models). I watch a small group of girls who want to determine the chemical makeup of . . . makeup (interest-based activities). I gravitate over to that group, where Jill's younger sister, Jenny, and her friends work together (cooperative learning). "This assignment is hard, and we may not be able to do it," some of them state bluntly. "We've discussed how you change over time, and I think you are capable of doing this (abilities are expandable). You know I've given you the tools to do it," I reply, "and it's not being graded on whether you do it perfectly. I want to see your thinking. What do you think?" (encouraging risk-taking). We discuss the pros and cons of various approaches, and I encourage this conversation, knowing that even to have the conversation requires taking a risk. I help

the group break the assignment into smaller, more manageable tasks (goal-setting). After several false starts, the group manages to complete the assignment, and I'm quick to suggest, "You are learning how to reason your way through these activities. I think you are improving!" (specific praise, abilities are expandable). I reward the group with some free time. Two of the girls move to the technology center and two move to work on a "Creatures of the Rainforest" puzzle (technology and spatial activities).

Sighing, I think of the long road here, and the effort required for me to make my science classroom more engaging and challenging and enjoyable for all of my students. The payoff, though, occurs when Jenny approaches me, and timidly smiles. She is shy, like her sister, Jill. "I love science!" she whispers, and I smile, too. I'm on my way.

Conclusion

Women are making progress in many areas of science, but a gender gap still remains, especially in physics, computer science, and engineering, and at advanced levels of academic and career achievement. Today's teachers can help narrow this gap by instilling a love for science in their female students and by helping them to understand and develop their abilities. However, to do so we must move away from traditional classroom practices and incorporate some new ways of teaching. We need only heed the words of one of the world's first computer scientists, Grace Hopper, who stated, "The most dangerous phrase in the language is 'It's always been done that way'" (Hopper, 2007). Trying a different way requires thought and effort, but the rewards could prove great in the 21st century. **GCT**

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