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A Look at Girls' Attitudes Toward Math, Science, and Technology. Are We Really Making a Difference?

by Laura Reasoner Jones

In April, 2002, I presented the results of my seven-year action research project at the FCPS Teacher-Research Conference. But, instead of rounding off a successful project and tying up the loose ends, I am filled with new concerns and questions. Are we ever going to change girls' attitudes toward these subjects? Are we ever going to make a difference? I wonder.

In 1995, at the open house for the new science/technology magnet school where my ten-year old daughter had been invited to attend, we joined other parents and students for an exciting two-hour session observing and participating in computer simulations, science demonstrations and language arts projects. Afterward, my excitement about the coming school year was dampened by the realization that every time Julie went to try one of the math/science/technology activities, she had been pushed out of the way by the boys, or had not been called on by the group leader. She had not been willing to try the new activities, and she, too, was aware of her reluctance. Back in the car, she said, "Math is hard, Mom." I felt like I was talking to the recalled Math Class Barbie doll.

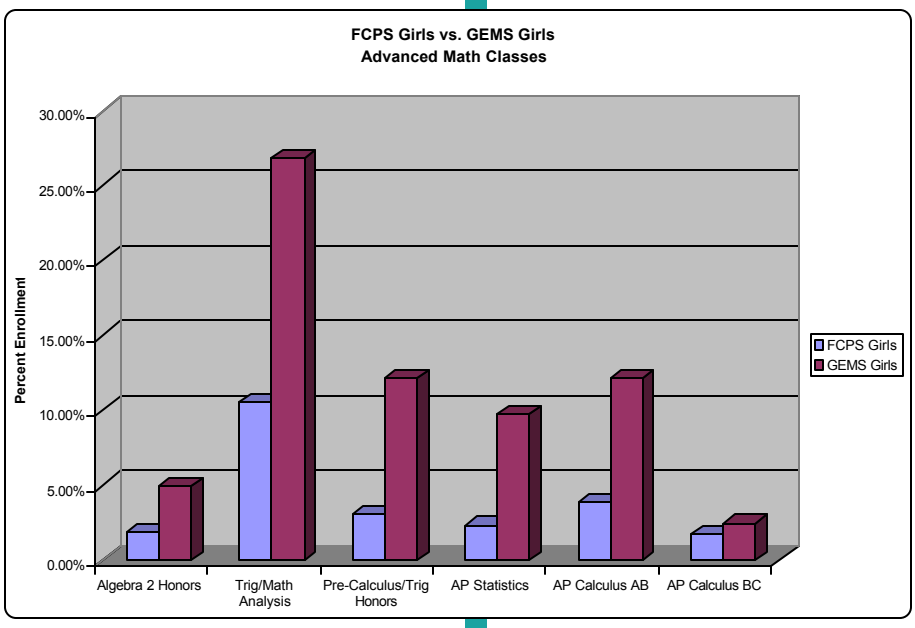
I knew I had to take action. I did extensive research on girls' attitudes toward math and science. I brought the Legos out of the basement, and I stopped saying I was bad in math. I also started an after-school club for fifth and sixth grade girls at my daughter's old elementary school. We had a blast. We built candy bridges, made Moebius strips, made our own paint, and designed mazes and microwave towers. We ignored the SOL's. This was the start of my research project.

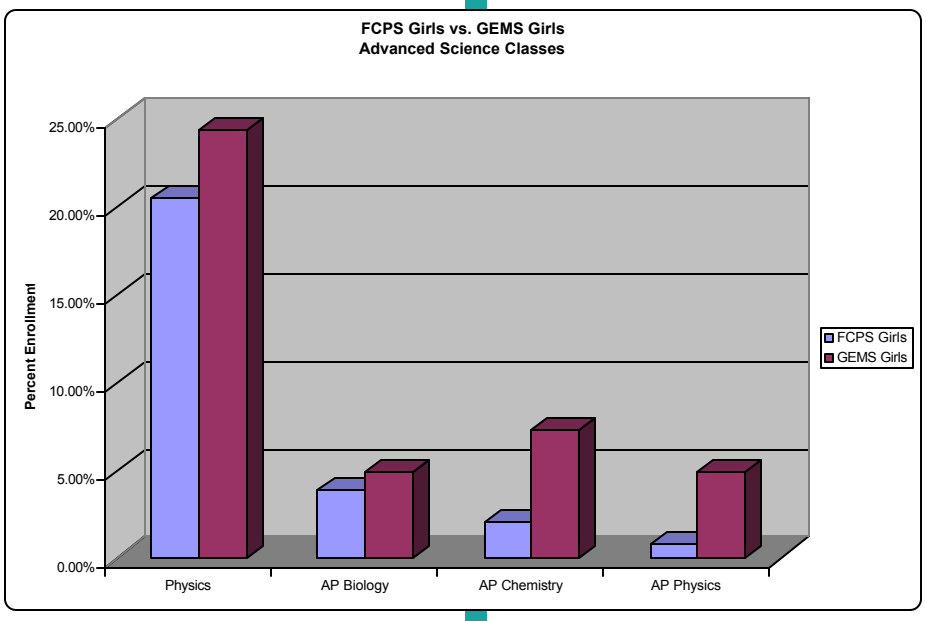
One of the major findings of the educational research at that point in time was that girls tended to self-select out of the more difficult math and science classes in junior high and high school, thereby limiting their options in college and careers. My goal for my GEMS (Girls Excelling in Math and Science) club was to show my club members that math and science, and later, technology, was so interesting and fun that these subjects were worth pursing in high school classes and careers.

In 1997, when I did my first research study of the group, I found that in the short run, a year after these girls had completed the club activities, three groups of stakeholders saw changes.

Girls' Attitudes, continued

The girls, who were now in seventh and eighth grades, felt that math and science were easier for them than they had previously thought. They also saw themselves as heading toward careers in these fields. One of the eighth grade girls excitedly described her work in science that year creating Bohr models of elements in the periodic table with computer graphics programs. Another girl said that Algebra had been hard for her in the beginning because it was so abstract, but that she was doing better. She said, "Thinking in logic is hard." Yet another girl said that her biggest difficulty in science was in drawing conclusions after the experiment was completed.





I asked them if participating in GEMS made math or science any different – any harder or easier. Each girl said that these subjects were easier. One girl said, "Science has been an adventure." Another said, "GEMS enriched my sixth grade." A third girl said that she was more equipped to attack strategy and logic problems.

The parents, who had only provided transportation and snacks for the club, saw more independence and confidence in their daughters. One mother said her daughter was "always late leaving the building" and "always had a good time." Another mother remembered that her daughter was "thrilled" when she was invited to join GEMS by her teacher. One parent reported the pride in her daughter's voice when she showed her mother the structure she had designed and said, "We built that." Another mother stated that GEMS engendered a contagious excitement that "math was cool." The girls were excited about the activities and enjoyed being with "just girls."

One parent reported that the group identification "We are GEMS members" made a positive difference. Her daughter had made an active choice to join, thereby making a statement about herself: "I choose to spend time on math and science."

But they also indicated concerns about the future, expressing anxiety about the opportunities available to girls. Several parents expressed anxiety about financial stability for their children. They

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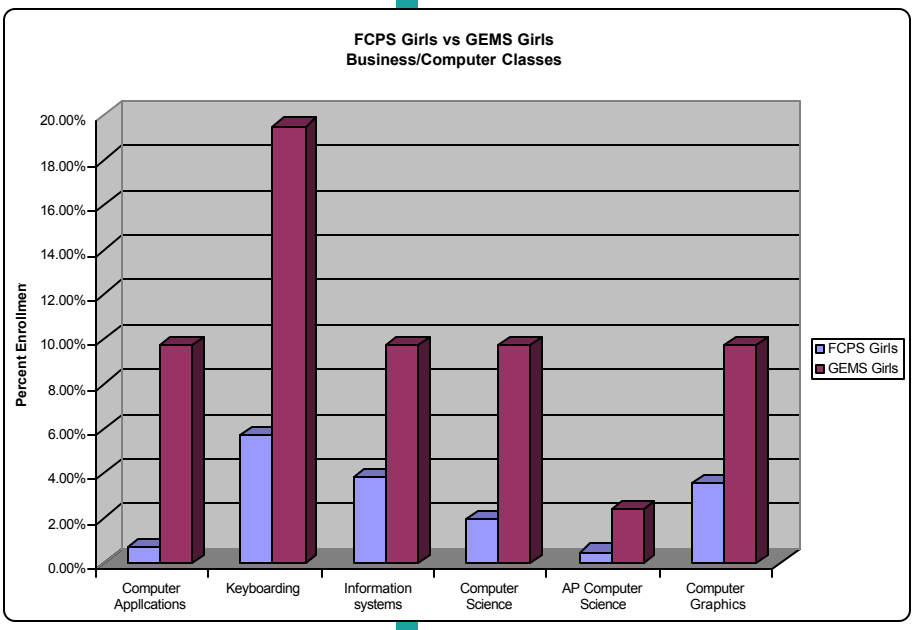
Girls' Attitudes, continued

were concerned that even with a good degree, the girls wouldn't be paid what they're worth. One mother (with three girls) said, "It's much harder [to think about futures] than if we had had boys." She cited family members whose equally talented and qualified girls had experienced more difficulty than their brothers finding jobs in business.

Another mother said that girls have a tougher road. She was very concerned about how her daughter would reach her goals. She emphasized the need for mentors for these young women "to keep the spark going."



The elementary school teachers also saw more confidence in the GEMS girls, and mentioned the pride the girls took in the activities and products they were completing in the club meetings. Many girls shared their experiences in class or in animated discussions before school. Some of the boys became interested in the activities and asked to join the club.

The teachers indicated that they had seen more risk-taking by "borderline" girls. "A few have blossomed" was another comment. The fifth and sixth grade teachers also felt that the girls looked forward to Thursday afternoons. They indicated that some girls had developed more independence and that others were beginning to show respect for each other. The principal felt that GEMS had increased the comfort level of girls in math and science. She said that "anytime we can provide an opportunity to expand horizons, we should do it."

Each semester I tried to point out that math and science are made up of many different types of skills within the subjects. I tried to show them that they might intuitively grasp logic/strategy problems, but not have a clue, for example, how to visualize and build a structure that would support a can of Coke. This disparity in skills in school could result in a lower grade, but in GEMS, it meant that you should seek a partner who needs your skills and who has the skills you need. My goal was to help these girls realize and celebrate their potential.

In 2002, as the first group of GEMS girls prepared to leave high school, I contacted 41 of the original members who were juniors and seniors. I asked them about their course selections and their career plans. The findings were fascinating. I compared the enrollment of these girls to the enrollment of girls in FCPS and found that indeed, these GEMS girls had chosen a higher percentage and many more of the higher level math and science classes offered by FCPS. In addition, although this was not my original focus, I asked about their enrollment in technology classes and compared that to the girls in the county.

Girls' Attitudes, continued

My original purpose for starting GEMS was to see if a club could make a difference in attitudes toward math and science. The research at the time of implementation showed that girls were opting out of the harder math and science classes in high school. My plan was to see if I could keep them interested in math and science so that they would choose to take these harder classes, even if they did not choose these fields for careers. The research at the time also showed that girls earned more money after college if they had taken high level math and science classes-their opportunities were not as limited. I defined a higher level math or science class as one that was more advanced than that required for a standard diploma, or one that was tracked by the Fairfax County Office for Women Task Force on Girls and Technology.

But now I wonder. Yes, with no additional intervention, my GEMS girls took significantly more high-level math/science/technology classes than the average FCPS female student. But these girls still have no interest in math/science/technology careers, and they continue to say "I'm just not a math person," Computers get more confusing every day," and "Science is not my subject." Yes, they have taken the classes, so their options are more open than before. But have we done anything to change the perception of careers in math/science/technology?

I am the recipient of an AAUW Educational Foundation Grant, working this year to turn AAUW's research report "Tech-Savvy Girls" into a video and viewer's guide. These will be distributed free of charge to every FCPS school, every AAUW branch nationwide, and shown across the country via the Fairfax Network. The central purpose of this video is to put the concerns in front of the stakeholders: If we're on the "Information Highway" and the girls can't drive, our journey may not take us in the direction that benefits everyone. Without the female perspective and talent bank in the continued progression of IT, what will we lose? What perspective and new directions will be lost?

Think how cars have changed and have become more family-friendly since women became involved in the design process. Look at the changes to medical internships and residency programs since women became a critical mass in that field. Consider the impact the female perspective has had on the profession of architecture. These perspectives benefit everyone. Can we afford not to have that in Information Technology?

Girls in the AAUW report, in my club, and in the video focus group are all saying: "We can, but we don't want to." They see that they need the background knowledge, the advanced math/science/technology courses, but after years of subtle pressure, they make active choices not to choose those careers.

My GEMS club goes on. We have created 7 more clubs in this county with the help and support of the Fairfax County Office for Women. We explode things, create chemical reactions, grow crystals, and build robots with Society of Women Engineers student members. We provide role models and early success in non-threatening environments. What more can be done?

I challenge us all as teachers: to make the classes more girl-friendly, to encourage female enrollment, and to encourage discourse and cooperation, not competition.

Girls' Attitudes, continued

And I challenge us all as teachers, parents and community leaders:
start early with our girls, encourage and support risk-taking, avoid rescuing, allow sweat and dirt, and to praise and recognize the girls for their skills, ideas and successes, not for appearance, neat products, or quiet behavior.

Catch them young and put them in the driver's seat. Make that "Information Highway" a girl-friendly place and we will all reap the results.

About the Author

Laura Reasoner Jones is on loan from Fairfax County Public Schools as a Teacher in Residence at the National Board for Professional Teaching Standards. She is working on the Digital Edge Project, creating a digital library of video, text, and accompanying documentation showing accomplished teaching with technology. To reach her, e-mail ljones@nbpts.org.