



## **Sisters in Sport Science: Using Sports as a Vehicle for Science Learning**

by  
Penny L. Hammrich, Temple University

The American Association of University Women (AAUW, 1998) publication, *Gender Gaps: Where Schools Still Fail Our Children*, posits a variety of positive effects that sports can have on children. It suggests that “sports participation in general is linked not just to higher academic achievement but also to better physical and mental health and greater leadership capacity,” and “like classroom interactions, sports can either challenge or reinforce stereotypes about girls’ and boys’ roles” (p. 74) and “prompt students and adults to question their own assumptions about gender” (p. 77).

The Sisters in Sport Science (SISS) program seeks to address gender equity in science by providing girls with exposure to sports and science and encouragement to participate in related activities. The program is designed for sixth-, seventh-, and eighth-grade girls attending urban middle schools and furthers the vision of its predecessor program, Sisters in Science, which was geared toward similar fourth- and fifth-grade girls. Like its predecessor’s, SISS’s vision is to increase girls’ positive attitudes, achievement, and exposure to science. However, SISS is unique in that it teaches science concepts within the contexts of playing sports. By doing so, the program is successfully reaching students in a variety of ways and strengthening the

education of students in science and mathematics by creating a unique and diverse pedagogical atmosphere.

### **Goals and Objectives**

The overall goal of the proposed project is to design, implement, evaluate, and disseminate a field-based program aimed at fostering the access that sixth-grade through eighth-grade minority girls have to science and mathematics through the vehicle of sports. The project builds upon the two-year intervention of the National Science Foundation’s Sisters in Science program (Hammrich, Richardson, & Livingston, 2000) and provides a second level of intervention for a sustained longitudinal look at how girls are achieving in math and science. The project builds upon the existing Science, Engineering, and Mathematics (SEM) curriculum through specific activities and learning methods shown to increase minority girls’ interest and achievement in SEM through the vehicle of sports. The following objectives are being pursued:

#### **Objective 1:**

To increase science and mathematics achievement of minority middle-school girls through the vehicle of sport.

#### **Objective 2:**

To increase the number of effective

teachers and coaches who will co-facilitate sports as an avenue for science and mathematics learning.

#### **Objective 3:**

To enhance the self-identities of minority girls in the areas of self-esteem, physical fitness, skill development, goal setting, and problem solving through the vehicles of science, mathematics, and sport.

#### **Objective 4:**

To increase families’ and caregivers’ knowledge of sport as an effective way to foster achievement in science and mathematics.

#### **Objective 5:**

To increase minority girls’ awareness of careers in science, mathematics, and sport-related fields.

### **Method**

The SISS program is a three-year intervention involving teachers, college students, minority athletes, mentors, and 540 minority girls from six middle schools. The focus is on providing a longitudinal intervention at the middle-school level that expands on the efforts of the Sisters in Science program, which targets the elementary school. The six middle schools

participating in the SISS program receive students from the Sisters in Science schools.

Year One of the program focuses on sixth-grade girls, targeting fencing, tennis, golf, and basketball. The girls participate in the following activities: after-school programs, special sport day events, and summer internships.

Year Two of the program focuses on the aforementioned sixth-grade girls who are now seventh graders, targeting volleyball, soccer, and track (running). The girls participate in the following activities: Saturday academy programs, special sport day events, and summer sport science career camp. Also during Year Two, a new set of targeted sixth graders begins the first level of intervention mentioned above.

Year Three of the program focuses on the same initial group of sixth-grade girls who are now eighth graders, targeting softball, hockey, and lacrosse. The girls participate in the following activities: Saturday academy programs, special sport day events, and academic internships in career fields. Also during Year Three, the second set of sixth graders (now seventh graders) progress to the second level of intervention, a new set of targeted sixth graders begin the first level of intervention, and so on.

All of the girls who participate in the program are assessed at the program's beginning and end to determine if they acquired the specific knowledge and information that was imparted. The participants are assessed with respect to their academic performance in science and mathematics. Report cards are used for science, mathematics, and behavior comparisons. Associations between independent (program activities) and dependent (grades and behaviors) variables are then deduced and analyzed.

## Results

The specific improvements sought by the SISS program are in the areas of attendance, parental awareness, and

grades. Of the parents surveyed prior to and after their daughters participated in the program, parents increased their awareness by 60% (33% awareness at the beginning to 83% at the end of the year). At the beginning of the program there were 89 girls registered with 88 attending regularly. By the end of the year there were a total of 138 girls registered with 91 attending regularly. Eighty percent of the same girls participated throughout the program.

Findings to date show that the girls in the program have increased their interest and achievement in science and mathematics and their understanding of the relevance of science and math to the sports in which they have participated. For example, a sample of 20 students who were interviewed during the program all indicated that they were having fun, were enjoying the program, and were able to cite at least one fact about tennis that they had not known prior to participating in the program. Of the 20 respondents, 80% could remember scientific facts that were learned during the program sessions. For example, respondents mentioned facts about angles, measurements, reflection, and awareness of careers in science. Seventy percent of the respondents (14 of the 20) felt that the SISS sessions reinforced the science instruction that they had received in school from their teachers. One hundred percent of the respondents (20 of the 20) felt that playing tennis was what they liked most about the program. With respect to girls' grades at the beginning of the year compared to the end of the year, t-test results showed that the girls achievement scores (grades) in both mathematics and science increased significantly ( $p < .05$ ).

## Implications

While programs that address the equitable achievement for all students in science and mathematics are not new, using sports as a vehicle through which science and mathematics interest and achievement can be attained is unique.

This approach bridges the application of concepts embedded in science and mathematics to the mechanics of performing a sport. Sports provide a unique and innovative approach to reaching students in a friendly atmosphere while learning concepts usually too abstract for them to grasp due to their limited experience and exposure.

Another unique feature of this project is the focus on middle-school science and mathematics. It responds to a dearth of attention to this level in public schools and fills a gap in the relevant literature. Middle-school students often experience a drop in grades due to lack of organizational skills and difficulty adjusting to the requirements of several teachers. Learning science and mathematics principles through participation in sports will help students through this transition phase and will reduce their chances of "falling through the cracks."

The project is also targeting students who have participated at the elementary school level in Sisters in Science. Because elementary schools participating in the Sisters in Science program are feeder schools for the chosen middle schools, the students are able to continue in an intervention program aimed at helping them succeed in science and mathematics. It also allows the researchers to longitudinally track girls who participated in Sisters in Science and then continue to participate in the SISS program, creating a second-level intervention or double treatment.

## References

- American Association of University Women. (1998). *Gender Gaps: Where schools still fail our children*. Washington, DC: Author.
- Hammrich, P., Richardson, G., & Livingston, B. (2000). Sisters in Science: Confronting equity in science and mathematics education. *Journal of Women and Minorities in Science and Engineering*, 6(3), 207-220.