

# Girls in Science Replication Manual



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A PROGRAM FROM THE DEPARTMENT OF BEHAVIORAL SCIENCE,  
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## Introduction

In 2002, the University of Kentucky, Department of Behavioral Science was awarded a grant from the National Science Foundation (Grant Number: 200201301346), to encourage middle school girls to pursue careers in science, technology, engineering, and math (STEM).

This manual was designed to replicate the *Girls in Science* program. This manual is a reference and a guide from program recruitment to evaluation. It also presents lesson plans. While each science outreach program for girls is unique, this manual is a useful reference to create and maintain girls' interest in STEM fields and careers.

Our review of gender-related differences revealed that, although girls and boys enter school with similar abilities, during the middle school years girls begin to lag behind males in perceptions of their abilities in mathematics, science, and technology related skills. Girls also lose interest in science and math as early as seventh grade (Hansen, 1996), and by eighth grade, girls' interest in mathematics and confidence in their mathematics abilities have eroded, even though they perform as well as boys in math (NSF, 2004). Our data as well as the existing literature (Mendez, Young, Mihalas, Cusumano & Hoffman, 2006), underscores the importance of targeting middle school girls in grades 6 to 8. By the time girls reach high school, they already believe that science and math are for boys. Consequently, girls do not take courses to prepare themselves for advanced science and math coursework. Girls from low income families are at greater risk for negative stereotypes and other influences which convince them that they cannot excel in science and math (Arnold & Doctorff, 2003). Additionally, little to no access to computers outside of school and the lack of academic enrichment opportunities can further increase the risk of girls from low income families.

The *Girls in Science* program provided a unique opportunity to impact girls to enter the fields of science, math, engineering, and technology. Girls ages 11-14 participated in program activities that demonstrated the inter-relatedness of science to all aspects of life. Specifically, investigative learning, collaboration, hands-on activities, and innovative technologies were emphasized in the learning environment.

For two consecutive years middle school girls and teachers were recruited and selected from the same 21 counties in rural Appalachia Kentucky and were selected to participate in the program. The girls came to the University of Kentucky (UK) for a one-week summer camp experience. Throughout the school year, they attended bi-monthly Saturday sessions in participants' local communities at 2 & 4 year post-secondary institutions. In addition, each participant was paired with a UK/Scientific and Community mentor. Over the project's three years, 116 middle school girls completed the program. It is our hope that this manual will help meet the career shortages in STEM careers by increasing the girls' interest and confidence in science and math related careers. To be prepared for college it is important for girls to take advanced math and science courses in high school. Some exposure to the wide range of science and math careers can help girls begin to make important choices about their future.

Teachers were also involved and attended 2 day professional development workshops on the University of Kentucky campus during the summer over the 2 years of the program. Parents also attended workshops during the girls' Saturday sessions on gender equity issues at home, in the media, and at school.

The aims of the *Girls in Science* program were to: 1) Increase the scientific and technological knowledge of selected girls in rural Appalachia Kentucky. This aim was accomplished by designing and implementing a one-week summer camp experience and bi-monthly Saturday sessions; 2) Train parents and middle school teachers on gender equity and strategies to increase selected girls' participation in science, math, engineering and technology. This aim was accomplished by providing 2-day teacher professional development workshops during the 2 year program and providing workshops to parents during the bi-monthly Saturday sessions; and 3) Enhance science education at the middle school level in southeastern Appalachia Kentucky. This aim was accomplished with this manual.

This manual presents a, step by step, guide to develop and implement the *Girls in Science* program. The manual includes a detailed description on recruiting students, application and selection, registration materials, evaluation, recruiting mentors, and finally lesson plans.

Parts of the manual are reproduced with the permission of the original sources and references found in each lesson plan. They are Dr. Tom Kelly, Dr. J.W. Yates, Dr. David Clark, Dr. Matt Webster, Mrs. Linda Jouridine, Ms. Sally Shafer, Dr. Joe Straley, Mr. Steve Cook, Dr. Ken Perry, Dr. Don Frazier, Margaret McConnell, Ms. Maureen Sellers, Ms. Kim Scott, Ms. Cathy Poteet, Dr. Michelle Mattingly, Mr. John Hicks, Ms. Kenna Jasper, Mr. Tom Welch, Dr. Matt Webster, Dr. Jeff Osborn, Dr. Christina Charriez, Ms. Beth Bell, Mr. Merwyn Jackson, Dr. Tom Troland, Dr. Sue Nokes, Dr. Czarena Crofcheck, Dr. Janet Lump, Dr. Charles Knapp, and Ms. Anne Tincher.

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## Evaluation Approach

Your program may not have an evaluation component. However, evaluation information proves invaluable when applying for funding. Consult with researchers about an evaluation plan that will meet your needs.

The *Girls in Science* program outcome was assessed by comparing responses from applicants not selected to participate in the two-year program to those that did participate in the program. The initial measures were administered during the application process. In addition to the application materials, potential applicants were asked to fill out a questionnaire, which was not considered in the selection process. The measures included a self-esteem scale, a personality questionnaire, a science self-efficacy scale and an attitudes-toward-science scale. Applicants were also asked to sign an informed consent form and ask their parents sign a parental consent form. Participants completed selected measures before and after the one-week Summer Session for each of the two-years participants were enrolled in the program. Participants will also complete selected measure two years after the program and 4 years after the program (post-program follow-up). We are currently collecting post program data.

## Introduction to the Girls in Science Curriculum

The *Girls in Science* program empowered the girls to excel in Science, Technology, Engineering, and Math (STEM) and encouraged the girls to think about what their future may hold for them. During the one-week camp, the girls attended a variety of classes taught by college professors and researchers that allowed them to gain confidence both inside and outside of the classroom. The program was about discovering, creating, and solving mysteries that girls are good at and the classes the girls attended helped them to accomplish this goal. The interactive classes provided a hands-on working environment in which the girls worked independently or cooperatively with other girls exploring the worlds of STEM careers, and how much fun these challenging and male-dominated subjects can actually be in a classroom environment that they are comfortable in; a safe place.

The lesson plans present the diverse classes that our participating girls had the opportunity to attend during summer camp. These lesson plans include medical, physical, and social science concepts to pique the interest and curiosity of young girls to enter STEM careers. Specific lessons may be adapted for a variety of grade levels. The *Girls in Science* program had the unique opportunity of using the University of Kentucky facilities and resources. Similar resources are available in your community. We suggest contacting Health Departments, area health education centers, universities and colleges, health practitioners, museums and businesses to identify the specific resources that are available in your area.