

GREAT!

Girls Redesigning and Excelling in Advanced Technology

FastLane Submission: Major Research and Education Activities

Introduction

In June, 2001, the Miami Museum of Science received funding from the National Science Foundation to design and implement an innovative model program to increase the confidence, interest and preparedness of girls (with emphasis on girls of color) to pursue academic and employment opportunities related to high-end careers in the field of information technology (IT). Girls Redesigning and Excelling in Advanced Technology (GREAT!) is engaging middle school girls in Saturday and summer programming, helping them to acquire progressively complex technology skills as they create a series of IT products, culminating in the creation of a fully-interactive 3-D virtual reality exhibit. Building on the body of research related to girls and IT, including lessons learned from prior NSF-funded projects at the Museum and CCT, GREAT! will develop and model effective methodologies for engaging girls as designers – as opposed to simply users – of IT applications.



The Miami Museum of Science

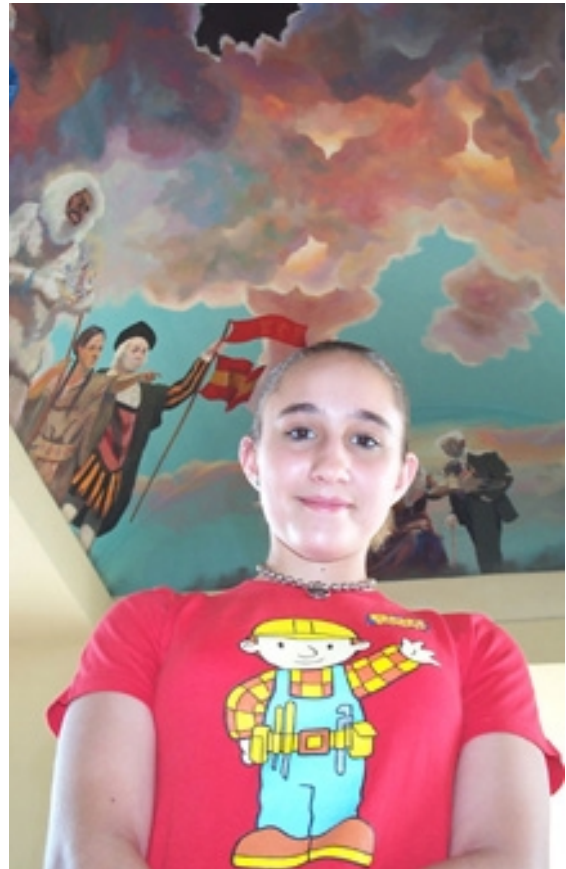
The Miami Museum of Science has over a decade of experience in youth programming focused on providing low income youth with training, mentoring, work experience, academic enrichment and skills in the use of technology. Girls RISE, funded by NSF, was a model project designed to build self-confidence and encourage middle-school girls to develop and maintain an interest in science, engineering and mathematics-related careers. A three-year follow-on project, SECME RISE, extended successful Girls RISE strategies and practices to middle schools throughout Miami-Dade County Public Schools, working through teachers leading extracurricular (SECME) science clubs to raise teacher awareness of classroom equity strategies and recruit girls to participate in intensive

four-week summer peer leader institutes focused on engineering design challenges, technology skills, and building awareness about SMET careers.

Overall Goal and Objectives

The overall goal of *GREAT!* is to raise interest and skills in advanced technology applications among middle school girls, particularly girls of color, resulting in increased representation of females in academic programs and employment opportunities leading to high-end information technology careers. Objectives are:

1. **To build girls' confidence and expertise with advanced technology applications.**
2. **To engage girls in the use of advanced technology to solve real-world problems.**
3. **To strengthen girls' communication and presentation skills.**
4. **To contribute to and inform the field through a comprehensive evaluation of project outcomes.**
5. **To disseminate project methodologies and findings among informal science education institutions and other interested parties.**



In working towards accomplishment of these objectives, the following activities were carried out between June, 1st, 2001 and March 1st, 2002.

1.1 Building girls' confidence and expertise with advanced technology applications

Mentor Recruitment

As indicated in the Museum's *GREAT!* proposal, female college mentors majoring in technology-related fields are playing a key role in the program. The Museum had originally planned to hire 5 mentors, based on prior project experience. However, given the configuration of the new computer lab being used by the *GREAT!* program (a state-of-the-art 21-station PC lab donated by Intel and Premio under an existing Museum grant), the Museum opted to hire only three mentors for the academic year component (the Intel Lab features three circular 'pods' with seven stations each). Two of the three mentors hired for *GREAT!* had worked on the Museum's earlier NSF-funded gender equity project (SECME RISE), which just ended in August, 2001. All three mentors are enrolled at the University of Miami. One is a computer

science major, one is a biology/pre-med student, and one is studying accounting. All three are African American. The project's co-directors conducted 2 half-days of training for mentors, reviewing proposed content, Museum protocols, and strategies for working with the girls.

Participant Recruitment

Building on contacts established with middle school extracurricular science clubs, staff successfully recruited a total of 44 girls to participate in Year 1 of *GREAT!*. Staff developed an engaging flyer describing the *GREAT!* program and direct mailed this to science teachers at Region IV middle schools, the region targeted by *GREAT!*

Design Team Meeting

The Museum held a design team meeting on September 22nd, 2001. The project's external evaluator, the Virtual Reality consultant, and the design consultant from the Center for Children and Technology all boarded planes and flew to Miami from California, Idaho, and New York City, respectively, just 10 days after September 11th, testifying to their commitment to this project.

The Design Team reviewed key project goals, objectives and activities, received a demonstration of the VRQuest 3-D Studio Max virtual reality plug-in, and discussed different options for supplying the 'context' for girls VR productions, i.e., based on existing VRQuest templates focused on "Inventions of the 21st Century", or Museum artifact-based quests, or more open-ended approaches. The team also focused on the project's evaluation plan, identifying key instruments needed for project start-up, milestones, and timing for follow-up site visits.



Participant Orientation Day

On October 27th, 2001, the Museum hosted an Orientation Day for all applicants and their families. Orientation Day was used to introduce girls and their families to the Museum, explain the objectives and activities of the program, and answer any questions. Girls were also divided into two cohorts, based on where they lived, to facilitate provision of bus transportation for the summer portion of the program. Family members and girls were also able to par-

ticipate in special event programming as part of Family Health Day, sponsored by Pfizer Corporation in conjunction with the Museum's *Microbes!* exhibit which was featured at that time.

Saturday Programming

Regular Saturday programming began on November 10th. Since then, each cohort of girls has attended 6 sessions. One mentor was assigned to each 7-person 'pod' in the Intel Lab. One of the project's co-directors and all three mentors are present at each session. Initial sessions were devoted to familiarizing the girls with the Museum environment, team building, and setting up a closed on-line community to facilitate communication among and between girls, staff, and mentors.



The first skill-oriented sessions focused on using the Internet. Through a combination of learning cards, staff- and mentor-led presentations, and peer-to-peer assistance, girls learned to navigate the web, carry out category and key word searches, evaluate on-line resources and bookmark their favorite sites. Working in teams, girls used these skills to research and create a public service announcement oriented at their peers, on a health-

related topic of their choosing. The girls generated some thought-provoking and engaging presentations reflecting their interests and concerns, choosing to explore such topics as teen pregnancy, teen smoking and drinking, body-piercing, tattooing, and eating disorders. Teams' finished work was posted to the on-line community, allowing participants to view and comment on each others work and establishing the basis for a assessment rubric for participants to use in their own evaluation of their creative work.

Upon completing their PSAs, girls began on the next skills-based module focused on creating personal web pages. Using Netscape Communicator, girls created basic pages and began adding a combination of content about themselves and content focused on some object or artifact in one of the Museum's collections. Students built on their Internet skills to search for further information about the object of their choice and incorporate links and images from the Web. In subsequent sessions, girls were introduced to the digital camera, and practiced taking and downloading digital images to their desktops and then using Adobe Photodeluxe to manipulate and save images in formats suitable for web page incorporation.

As of March 1st, 2002, 6 sessions remain for each cohort. Planned content for the balance of the academic year will continue preparing girls for their intensive summer Virtual Reality design institute, by introducing them to working with graphics, creating panoramic views and object movies, and working with sound files. The final sessions of the academic year and/or the first few days of the summer program will introduce the girls to mathematics concepts required for working with the Virtual Reality technology, with emphasis on such topics as perspective, measurement, scale, polyhedrons, and tessellations.

Hiring of a Saturday Coordinator

Although the Museum opted to hire only three mentors given the Intel Lab configuration, as Saturday programming progressed, it became apparent that additional technology and mentoring support would enhance participants' experience, particularly given an apparent 'skills gap' among participants (see evaluation findings). The Museum has hired a Saturday Coordinator, effective February 14th, 2002. The Saturday Coordinator will provide additional support to girls during the final Saturday sessions of the academic year, which will be devoted to acquiring increasingly complex technology skills. She will also provide support during the summer design institute, allowing *GREAT!* to ensure that all participants receive the support they need to master the advanced technology skills. The Saturday Coordinator (Christina Chong) has worked in the private sector as a graphics and web designer. Her strong technology skills coupled with previous work on Educational Opportunity Programs at the Museum make her a tremendous asset to the program.



2.1 Engaging girls in the use of advanced technology to solve real-world problems

Installation of VR equipment and software

Consultant Erica Compton of VR Visions, the Museum's partner in *GREAT!*, worked with Museum technology staff to procure, install and test all hardware and software required for the Virtual Reality summer design institute. Compton also conducted a brief training for technology staff focused on system support and troubleshooting.

VR Materials Development

In preparation for the summer Virtual Reality design institute, staff conducted a series of meetings with VR Visions, focused on adaptation of existing VR Quest resources to create materials appropriate for *GREAT!* VR Visions has produced draft learning cards for the 3-D Studio Max component of the institute, introducing participants to the basic design tools for creating 3-D productions. Subsequent learning cards (still in development) will cover Maximum 3-D, or using the animation component of the VR package.

Virtual Reality Training for Staff

VR Visions conducted an initial three-day training workshop for Museum staff involved in the project (the Co-Project Directors as well as Museum technology staff), the newly-hired Saturday Coordinator, and the District Supervisor for Mathematics at Miami-Dade County Public Schools, who is working with the Museum on development of mathematics curriculum in support of the VR technology training.

Training focused on the basics of 3-D Studio Max and provided an opportunity to test the draft learning cards as well as a chance to identify specific preparatory skills the girls will need to acquire prior to the summer design institute.

3.0 Strengthening girls' communication and presentation skills

Girls have acquired some initial experience communicating their ideas and working on their presentation skills through the initial technology modules. In crafting their public service announcements, girls selected an idea of their (team's) choice, decided how to word their message, and selected fonts, graphics and images to best present their idea. By posting their work in the MSN *GREAT!* on-line community and reviewing and critiquing each other's work, girls gained further getting their message across in an effective manner. Continued participation in Saturday programming and the summer design institute will further strengthen girls' oral and written communication skills, while their increased exposure to and mastery of technology will give them new tools to use for communication and presentation. As indicated in the proposal, their experience will culminate in the academic year following the design studio, when they will be engaged as weekend interpreters on the Museum floor, presenting, explaining and demonstrating their Virtual Reality productions to Museum visitors.

4.0 Contributing to and informing the field through comprehensive evaluation

In addition to participating in the start-up design team meeting, the project's external evaluator conducted a site visit in January, covering two weekends to allow for observation and interviews with both groups of girls. A report summarizing Year 1 evaluation activities and findings is attached as a separate FastLane submission.

5.0 Disseminating project methodologies and findings

No dissemination activities have taken place to date.