

Mending the Gap, Building the Pipeline: Increasing Female Representation in Tech

The National Center for Women and Information Technology found that though 57% of college degrees are earned by women, women represent only 18% of degrees in computer and information technology, and similarly, the number of women earning bachelor's degrees in computer science has decreased since 2000 [1]. Underrepresentation of women in computing is more prevalent in parts of the rural South than other parts of the country, likely influenced by traditional conservative gender norms in addition to a lack of extracurricular science activities [2]. This disparity is a problem shared by both STEM-based and humanities-based educators—to be literate in the 21st century, one must possess functional, critical, and rhetorical *digital* literacy skills [3]. As the AAUW argues, the absence of women in career paths demanding digitally literate producers of technology is more than just a gender issue; it is in fact an economic issue as the shift to a 21st century ecology in which information technology, nanotechnology, and biotechnology drive current national-level initiatives such as the President's Innovation Strategy, designed to create jobs and maintain the competitiveness of the United States in global economic development [4].

Research has shown that the later high school years may be too late to influence perceptions about career options [5]; thus, providing middle school girls with tech-savvy female mentors from a range of disciplinary backgrounds and facilitating playful and low-stakes opportunities to experiment with computing technologies is critical to addressing the disparities of women in computing majors and careers. The Computer Science and Engineering Department at MSU has provided such opportunities by hosting summer camps during the summers of 2011, 2012, and 2013. Under the purview of Sarah in 2013, the camp used a project-based approach to learning and was exclusively offered to middle school girls. Assessment results from this particular summer demonstrated that the camp increased confidence for many of the girls in using technology to create applications and their desire to pursue a college preparatory path. Stacy has also co-directed a project-based, grant-funded, computer camp for middle school girls out of the English Department at Bowling Green State University with similar assessment results—girls who completed the camp were more likely to seek out technological education opportunities and career paths [6].

Our proposed community engagement research project offers a novel strategy for engaging middle-school girls with computing by integrating digital composing and rhetoric with engineering education in order to integrate girls' needs to see the social relevance of computing and appreciate techniques for using computing for personal expression and narrative design. Through a collaborative effort, faculty from Art, Computer Science and Engineering, and English will develop a project-based curriculum for a residential camp for middle school girls aimed at bolstering girls' attitudes towards and aptitudes for technological savvy. We propose a low-cost, five-night summer camp for 20 girls entering seventh, eighth, and ninth grades in 2014 with a recruiting emphasis placed on students from underrepresented minority groups and those working to overcome hardships of a lower socioeconomic condition. Undergraduate and graduate female students in art, computer science or software engineering, and English will serve as near-peer camp counselors and reside with participants in the dormitories.

Our research emphasis will consider two primary questions:

1. How does integrating expression through writing and art into technical design projects impact perceptions of computing and technology among middle school girls?

2. How does a low-stakes, girl-centered, computer camp impact girls' future technical educations and careers? (I.E. How does such community-based work mend the gender gap and a pipeline from middle and high schools to colleges and universities?)

EXTERNAL FUNDING OPPORTUNITIES

We are applying for the Cross-College Faculty Grant in order to facilitate Art, Computer Science and Engineering, and English's collaboration on an innovative curriculum for the camp and effective recruiting strategies to target underrepresented groups. With such a curriculum and recruiting strategy fully articulated, we plan to apply for external funding in January 2014 and use the Cross-College Faculty Grant funds for recruiting efforts and materials. In light of the AAUW's continued commitment to research reports on the progress of women in STEM education and fields and their stated bias toward projects focused on K-12 technology education for girls, we have identified AAUW's 2-year \$5,000-10,000 Community Action Grant as a particularly promising program. However, we hope that through our collaborative efforts we can identify additional external funding sources and opportunities that will enable us to sustain a long-term commitment to fostering tech-interested and -savvy girls from the rural south.

DATA COLLECTION

Qualitative data collection and analysis will be used to assess the impact of the camp on attitude and aptitude. Participants will fill out a brief, open-ended survey on the first day of the camp. Surveys will be designed to measure what the girls hoped to learn at the camp, their background in math and science courses in high school, the level of encouragement they had received from adults to pursue math and science, and their existing levels of expertise with computing. The second wave of data collection will occur on the last day of camp; girls will be interviewed to determine what effects the camp had on their knowledge of various aspects of computing and their college and career plans. A written survey will also be administered at the conclusion of the summer experience and longitudinal data will be sought to determine if the camp has a recruiting impact on participants' education and career paths.

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