Globaloria: Students Designing Educational Games (Case Study 7)

An Engaging Way to Introduce Computing

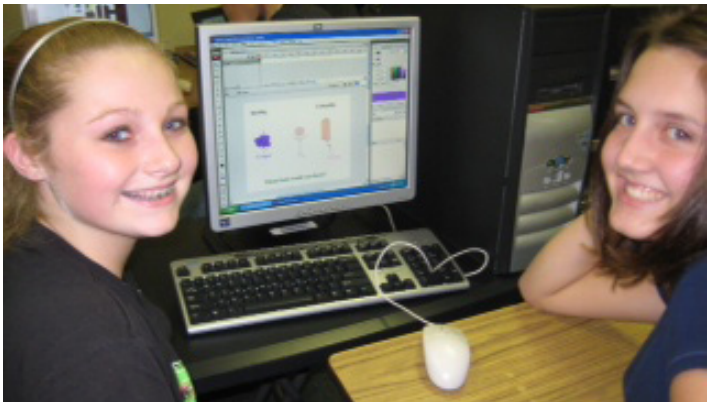
K-12 Education

Connecting computing to social issues and "real-world" problems is important for increasing all students' interest, but especially girls' interest, in computing education and careers. Globaloria, created in 2006 by the World Wide Workshop, builds on this principle by involving students in collaborative teams that create video games around important educational and social issues. The program, operating in several states, is the country's largest social learning network of schools and community centers using a game design curriculum to develop students' digital literacies, computing knowledge, and global citizenship skills. Generally, students' participation in Globaloria ranges from three to five times per week, for 60-90 minutes per session, over two semesters. In Austin, Texas, one school has implemented Globaloria into its core curriculum for all students from 6th to 12th grade.

EVIDENCE-BASED PRINCIPLES FOR CURRICULUM. Grounded in constructionist learning theories, Globaloria employs the following key elements necessary for successfully engaging students in introductory computing:

- Using active, hands-on, creative, and open-ended learning activities
- Making explicit connections between computing and social issues
- Promoting collaborative teamwork and opportunities for student interaction
- Allowing ample opportunity for student self-reflection on accomplishments and future learning
- Providing students with opportunities to learn and gain feedback from experts

EVALUATION: INCREASING FEMALE ENROLLMENT AND HOME COMPUTING ACTIVITY. Based on a study of West Virginia classrooms, Globaloria has demonstrated initial successes when it comes to girls' involvement in computing courses. Female enrollment in Globaloria elective classes reached 33% in 2010-2011 and 37% in 2011-2012, exceeding the national average for computing courses (20-25%). In addition, initial pre- and post-test analysis revealed that participation in Globaloria classes increased middle and high school girls' *home* computing activities; importantly, many of these activities involved creating and adapting technologies. For middle school girls, it also decreased the gender gap in "thinking up an idea for a technology project" and "making computer games." These trends in home computing experience may be especially important given research showing that, while girls and boys have similar access to computers and computing at school, girls have less access at home than boys.



The core curriculum is customizable and aligned to language arts, math, and science standards, allowing Globaloria to be implemented in a variety of formats, including after-school programs, electives during the school day, and core academic courses.

To what extent these increases in girls' computing activities translate to increased interest in or plans to pursue computing requires further research, but initial feedback from participating girls is encouraging. Consider the following comments from middle and high school girls in the program:

"I thought this class was only for boys; I thought geeks only used computers, but then I really got to see the neat things about it… It's not like boys get to do this or girls get to do this; it's whoever puts their mind to it, their heart to it, and their time, they can do anything." (middle school female participant)

"Globaloria is… letting girls have an opportunity to have a career and make computer games." (middle school female participant)

"I do consider ourselves innovators…at 15-years-old Globaloria has given me a chance to learn computer science and be a computer scientist." (high school female participant)

Future research is being conducted to determine the pervasiveness of these trends and how girls' interest in and plans to pursue computing education and careers change over time. Because some Globaloria sites involve students in the curriculum over the course of several years, these sites offer particularly promising opportunities for exploring longitudinal trends.

RESOURCES

For more information on Globaloria see www.worldwideworkshop.org/programs/globaloria and www.worldwideworkshop.org/reports

Ashcraft, C., Eger, E., & Friend, M. (2012). Girls in IT: The Facts. National Center for Women & Information Technology.

Wu, Z., Ashcraft, C., DuBow, W., & Reynolds, R. (2012). *Assessing Girls' Interest, Confidence, and Participation in Computing Activities: Results for Globaloria in West Virginia.* National Center for Women & IT.

NCWIT offers practices for increasing and benefiting from gender diversity in IT at the K-12, undergraduate, graduate, and career levels.
This case study describes a research-inspired practice that may need further evaluation. Try it, and let us know your results.

ncwit.org **Author** | **Catherine Ashcraft**

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How Do You Introduce Computing in an Engaging Way?

with Case Study 7

K-12 Education

Experience with computers between boys and girls has equalized, but boys continue to have greater knowledge of computing and programming *concepts* than do girls. Not so in biology, chemistry, or mathematics, where both boys and girls are encouraged to provide evidence of proficiency when they apply to college. High school study of these subjects familiarizes students with the content and concepts, and gives them confidence. The result is that women's undergraduate completion rates have neared parity in these disciplines.

Because IT study is elective in almost all K-12 schools, developing relevant and interesting assignments that appeal to a broader audience is recommended for:

- fostering a climate where the non-predisposed can belong both academically and socially
- recruiting students who are not predisposed to pursuing computing
- exposing fundamental computing concepts to inexperienced learners

Is prior programming experience required for students to be successful in an IT program? Most undergraduate departments would say no. That is, experience with programming is not the same as expertise in problem-solving, algorithmic thinking, or computing theory. Yet research shows that introductory courses and their embedded assignments work better for students who have *some* experience with programming.

Research also shows that students with programming experience are more confident and more successful in introductory courses than are their inexperienced peers. Students with lower grades or less confidence are less likely to persist in an IT major. What is more, when introductory courses have limited opportunities for talking to other students (e.g., collaborative learning), inexperienced students have little information on which to judge whether they belong academically in the major. Hence more women than men switch out of IT majors (most often to other sciences or mathematics).

MAKING IT MEANINGFUL

Educational researchers emphasize the importance of linking educational materials and curricular programs to students' existing knowledge and experiences. When class syllabi list topics and assignments that focus on unfamiliar concepts with limited, if any, relationship to a student's life experience or interests, she or he is unlikely to take that class. High school curricula contribute to low enrollments in college computing because, under the existing educational policy of election, computing is rarely required in secondary schools. This means that students are likely to have a narrow and inaccurate view of what IT study involves, what careers are possible, or what kind of people "do" IT. Given the very small proportion of females who study computing in high school, females are less likely to choose IT in college.

The challenge to educators at all levels is to develop engaging assignments and curriculum that can appeal to a variety of students with different learning styles, interests, socio-cultural backgrounds, and abilities, while maintaining the rigor of the discipline. Putting the concepts of computing in appealing contexts and building on existing competence can both reduce entry barriers and level the playing field for those with limited experience.

Creative assignments that teach algorithmic thinking while also calling on students' existing knowledge or interests, may serve to both recruit and retain students. When experienced and inexperienced students use non-computer-based assignments to learn computing concepts, they quickly realize that their peers with programming experience are not necessarily better at algorithmic thinking, just more experienced with programming. Building confidence through relevant and interesting assignments is a promising practice for motivating student enrollment and retention.

RESOURCES

Lecia Barker and William Aspray, "The State of Research on Pre-College Experiences of Girls with Information Technology." In McGrath Cohoon, J. and W. Aspray (Eds.) *Women and Information Technology: Research on the Reasons for Under-Representation*. Cambridge, MA: MIT Press, 2006.

Joanne McGrath Cohoon and William Aspray, "A Critical Review of the Research on Women's Participation in Postsecondary Computing Education." In McGrath Cohoon, J. and W. Aspray (Eds.) *Women and Information Technology: Research on the Reasons for Under-Representation*. Cambridge, MA: MIT Press, 2006.

Authors | Lecia Barker and J. McGrath Cohoon