The Impact of Pair Programming on Women Students

Objectives of Presentation:

The purpose of this presentation is to disseminate information about pair programming: a collaborative learning strategy to use for programming instruction. This information includes

- definition of pair programming;
- results of research done by University of California, Santa Cruz (UCSC) and by Education, Training, Research Associates (ETR) of Scotts Valley, California;
- video titled "Examples of good and bad programming;" and
- a set of slides to use for introducing pair programming to your school, college, or university classes.

Target Audience:

The target audience of this presentation is conference participants who are involved in computer science/programming education. For graduate students and teachers/professors, this presentation will give the participant a useful tool for teachers/teaching assistants of introductory programming courses. This strategy has been used in other programming courses; however, our primary research has been done with students in introductory programming courses.

Format of Presentation:

The presentation will be a set of slides and a pair programming training video for ages 12-18.

Proposed Session Length:

The total presentation is approximately 40 minutes long.

Overview of Information to be presented:

We have found pair programming to bolster university introductory programming course completion and pass rates. It also has been shown to contribute to the persistence of both women and men in university computer science related majors. This presentation includes the results of our pair programming university study of more than 500 introductory programming students. Additionally, we have used pair programming for use in an after-school program for middle school girls. This program called Girls Creating Games (GCG) was developed by Education, Training, and Research, Associates (ETR). Its purpose was to increase girls' interest, confidence, and competence in information technology. Included in the presentation will be a showing of a new video (created by ETR as a result of GCG and targeted at students aged 12-18) demonstrating good and bad pair programming.

Description of Written Materials to be made available:

Link to research on pair programming: http://www.cse.ucsc.edu/~charlie/projects/pairprogramming

Name and Qualifications of the Speaker:

Linda Werner, Ph.D., is a lecturer and researcher in Computer Science at the University of California, Santa Cruz. She has also taught computer science and mathematics at the community college, high school, and junior high school levels. Additionally, she has worked as a software engineer and educator at computer companies such as Data General and Wang Laboratories. Her research on pair programming has been recognized as influential.

The following details some of the dissemination of the results of her pair programming research.

- Pair-programming helps female computer science students by L. Werner, B. Hanks, and C. McDowell. Journal on Educational Resources in Computing (JERIC) Volume 4 , Issue 1 (March 2004) Special Issue on Gender-Balancing Computing Education. Please note this issue was published in April 2005.
- Pair Programming Improves Student Retention, Confidence, and Program Quality by C. McDowell, L. Werner, H. Bullock, and J. Fernald. To be published in CACM, 2006.
- Want to Increase Retention of Your Female Students? by L. Werner, B. Hanks, C. McDowell, H. Bullock, and J. Fernald. Published originally in the March 2005 edition of Computing Research News, "Expanding the Pipeline" column, Vol. 17/No. 2. From the website describing the Pipeline

column “Expanding the Pipeline is a regular column in Computing Research News (CRN), a publication of the Computing Research Association that reaches more than 6,500 researchers. The column serves both as a vehicle for describing projects and issues related to women in CSE and a source of information for issues faced by underrepresented groups in CSE. The column is guest-authored by individuals who share their insight and experiences from their active participation in programs designed to involve women, minorities, and persons with disabilities in CSE education and research.”

- Pair Programming and Gender by L. Werner, B. Hanks, and C. McDowell. Book chapter in Encyclopedia of Gender and Information Technology, ed. by Eileen Trauth. Idea Group, 2006.
- Invited speaker at the ITWF Workshop on Women and Minorities in Computer Science hosted by the ATLAS program at the University of Colorado, Boulder, CO. in August 11-13, 2003. Her presentation, titled “The Impact of Pair Programming on a Student’s Performance, Perception, and Persistence” was supported by a multi-year NSF grant titled “Retaining Women in Computer Science Departments: The Impact of Pair-Programming.” Linda was the principal investigator on this grant.
- The Impact of Pair Programming on Student Performance, Perception, and Persistence by C. McDowell, L. Werner, H. Bullock, and J. Fernald. Presented at the most influential conference in the field of software engineering, the International Conference on Software Engineering (ICSE) in 2003. See http://www.cse.ucsc.edu/~charlie/pubs/icse2003.pdf.
- Training materials, including video of ‘Examples of good and bad pair programming’ for use at the middle school level in an after-school and summer program. The program, called Girls Creating Games (GCG), is developed by Education, Training, and Research, Associates (ETR). The GCG program was designed to increase girls’ interest, confidence, and competence in information technology.
- Introduction to Pair Programming. Invited speaker at Java Engagement for Teacher Training Workshop (JETT/ACM) for high school teachers, August 4-5, 2005, Santa Clara University (see http://www.cse.scu.edu/jett/).

Additionally, Linda was invited to write a review of the book Gender and Computers: Understanding the Digital Divide by Joel Cooper and Kimberlee D. Weaver for the American Journal of Psychology. Her review, co-authored with Jill Denner of ETR, is titled “Gender and the Digital Divide” and appeared Winter 2005, Volume 118, Number 4. Linda is also an Adult Juror for Kids First! The Coalition for Quality Children’s Media (CQCM). See http://www.kidsfirst.org/kidsfirst/fbecju.htm.