

Project Summary

This ATE project is **JABRWOC**, "**J**ava-based **A**nimation: **B**uilding **viR**tual **W**orlds for **O**bject-oriented programming in **C**ommunity colleges". The project uses simulation and visualization in a 3D, interactive, animation environment to introduce fundamental, object-oriented programming concepts to novice programmers. The objectives are to (1) decrease attrition in introductory programming courses in community colleges, where open enrollment is conducive to high numbers of "at-risk" students, (2) attract students to computer and technology-related majors, (3) improve computer literacy courses to meet computer FITness guidelines defined by the NRC [5], by reintroducing a programming/problem-solving module, and (4) provide professional development for community college faculty in the use of innovative technology. Implementation occurs in three phases: (1) developing/modifying instructional materials including lab exercises/projects for traditional and returning learners, (2) pilot testing in on-campus and distance learning classes, and (3) dissemination. The methods of assessment include tracking attrition and achievement, pre- and post-tests, student surveys, and interviews of students and instructors. Control and test groups will be used for statistical analysis.

Intellectual Merit: The approach used in this project takes advantage of high-level interest in graphics, animation and storytelling (commonly found among students who have grown up in a multi-media world). Nonetheless, the major emphasis is the creative use of visualization to teach and learn a strong core of fundamental programming concepts and problem-solving techniques in an object-oriented, interactive environment. The software environment is Alice -- developed by Dr. Pausch and his Stage 3 team. Dr. Pausch will provide software support. Drs. Cooper and Dann will serve as team, curriculum, and professional development leaders. Dann and Cooper (supported by an NSF-CCLI grant) are currently having great success at four-year colleges in using this approach with introductory Computer Science majors. Dr. Moskal, an assessment expert, will collect and analyze the results. Three community colleges (large urban, medium suburban, small rural) will be led by Mr. Herbert and Mr. Taylor who have significant teaching and curricular experience and Mr. Howd, having technology and distance learning expertise.

Broader Impact: This project holds promise of an effective means of teaching object-oriented programming concepts, better retaining students in computer and technology-related majors, attracting new students to these fields, and helping to provide a key element of computer FITness [5] to all undergraduates. The developed materials will be stored (with materials Cooper and Dann previously created) in an online, searchable database. This database will provide a core set of materials applicable to a wide array of courses. Over 6000 students will be impacted at the three community colleges in this study. Philadelphia Community College has a large population of women and minorities. This study will lay the groundwork for a later study of the effect of this approach on these two groups. Dissemination of results will be enhanced by paper submissions to computer science education journals and conferences.