

ENHANCING CRITICAL THINKING AND COMMUNICATION SKILLS OF BLACK MALE SECONDARY STUDENTS FOR SUCCESSFUL STEM CAREERS

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Abstract

Culturally appropriate learning opportunities for students were provided by incorporating problem-based learning, active learning, and experiential learning within the teaching and learning modalities. Students' active involvement, and learning in the context where knowledge can be used, resulted in effective learning. For active learning to be optimal, the learning environment needs to be constructed so that students' involvement in the learning process, as well as their responsibility for learning, is increased. One goal of the program was to increase broadening participation of underrepresented populations in STEM programs and careers by providing early engagement of Black Male students in STEM programs and including opportunities to enhance critical thinking and communication skills needed for entering STEM workforce sectors. The Innovative Science, Technology Engineering, & Mathematics workforce development project (iSTEM –WORK) was designed to provide Black Male students with STEM challenging technological learning experiences that increased students' exposure to innovation and creativity in STEM disciplines. Underrepresented minority students in grades 6 through 10 were engaged in a long-term (3 year) STEM technology program that included a Summer Program, Hands-on Field Experience, and Saturday Academy during the academic year. iSTEM –Work bridged students from middle school into high school and included culturally sustaining: 1) academic and social integration and advising; 2) knowledge and skill development; and 3) support and motivation which ultimately impacted students' confidence, academic outcome and STEM career choices. Students reported the innovation class and learning about project steps were important in developing their interest in becoming a STEM professional. Students engaged in critical thinking as they worked on projects such as: brainstorming, gathering pertinent background information, drafting hypothesis, discussing pros and cons of potential solutions, reviewing and including new background information, finalizing hypothesis, concluding on best potential solutions. Students reported higher levels of Critical Thinking and Problems Solving on an 11-item scale as a result of participating. For example, the percent of students who reported "seeing patterns in solving problems where others would see items as unconnected" increased by 11% over the course of the program. Similarly, when considering a new project, the percent of students who reported strongly agreeing with their ability to "take an independent and innovative look at most situations" increased by 16% as did their ability to "see how ideas and techniques can be used in perceiving new relationships" and their ability to "find the argument to deny unsound propositions (i.e. propositions that contain of invalid facts)".

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