

The California Association of MESA Directors (CAMD) and the Basic and Advanced Science and Technology Academies of Research (B A STAR)

**Derrick W. Booth Ph.d, Milton Randle, Lucy Casale
Butte College, MESA / Fullerton College MESA / California Community College
Chancellor's Office and MESA**

Abstract

The California Association of MESA Directors is the self-governing body of the community college Mathematics, Engineering and Science Achievement (MESA) programs. The California Community College system is the largest higher education system in the world serving 2.9 million students at 108 colleges. Twenty-nine of these colleges host Mathematics, Engineering, and Science Achievement (MESA) Programs established to increase the number of under-represented and disadvantaged students obtaining technical degrees. The National Science Foundations (NSF) Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP) awarded a \$2 million grant to the California Association of MESA Directors (CAMD) in October 2003. NSF granted these funds to CAMD to conduct the Basic and Advanced Science and Technology Academies of Research (B A STAR). The B A STAR project is focused on enhancing its students academic, technical, teamwork and leadership abilities. Students in the program receive leadership training, targeted technical instruction and the opportunity to participate in scientific research. A key component of the B A STAR project will be to develop partnerships with companies who have a vested interest in increasing the number of students obtaining technical degrees.

Introduction

In 2003, the California Alliance of MESA Directors (CAMD) was awarded a \$2 million NSF-STEP grant to build a research infrastructure by establishing the Basic and Advanced Science and Technology Academies of Research (B A STAR). During the course of this 5 year grant, B A STAR will increase the number of students obtaining technical degrees by providing students the opportunity to develop technical, teamwork and leadership abilities. The B A STAR Program consists of the following sequential components:

- Leadership Development Conference (LDC)
- Basic Science and Technology Academies of Research (B STAR)
- Training and Employment as Academic Excellence Workshop Leaders (AEW)
- Advanced Science and Technology Academies of Research (A STAR)

During the first year, 150 students were invited to participate in the Leadership Development Conference (LDC). From that group, 75 of the participating students were invited to participate in the Basic Science and Technology Academy of Research (B STAR) following the LDC. The B STAR focused on providing a core understanding of physics principles as well as developing technical computer skills. During the second year of the program, the cohort is employed as facilitators for Academic Excellence Workshops (AEW) during the academic year. An AEW is a small community of students working collaboratively to master technical course material with the facilitator's guidance. During the summer of the second year, the same cohort will participate in one of five Advanced Science and Technology Academies of Research (A STAR). Each A STAR will be research and project oriented, relating to the participant's academic major with the guidance of a faculty or industry mentor.

Program Components

B A STAR Program Receptions

Early in the summer of 2004, the B A STAR program was introduced, and the goals and objectives of the program were shared with education and industry members. Two receptions took place, in order to reach more potential partners. The B A STAR program was shared in Southern California at the research and development facility of the Alfred E. Mann Foundation. In Northern California, the Hewlett-Packard Corporation hosted the reception at its Palo Alto headquarters. The audiences at both sites received the program enthusiastically. The Apple Corporation's sponsorship of the program was announced and as a result of the launch, Hewlett Packard has indicated they will allow the B A STAR program to use its A+ computerized teaching program in future years.

Leadership Development Conferences

The LDC was developed in partnership with the Jackie Farris Rees Leadership Group at California State University, Chico. The conferences took place during the Spring of '04 and were held at the Marin Headlands Youth Hostel in Sausalito, CA and the Alpine Meadows Facility in Big Bear, CA. The LDC provides a venue for students to work in a collaborative setting, in a remote location, that allows for introspection and the incorporation of new concepts that are rooted in the enhancement of one's personal qualities. These qualities can then be applied in a way that ensures excellence for the individual and for the team/group. For most students, this is the first opportunity they have had to learn about personality traits, leadership preferences, and learning styles. The LDC begins each student's development as a leader and enhances perspectives on the career discovery process.

Through the Leadership Development Conferences (LDC), students attend a series of workshops that help them discover, or affirm, their leadership styles. The workshop topics include the Meyers-Briggs Type Indicator; Team Building; Learning to Work as Part of a Team; Effective Communications; Conflict Management; Understanding Diversity; and Be A Star Leader. The LDC experience is a very important because the B STAR students will advance to

the A STAR program and are expected to be workshop facilitators in future program years. This leadership experience sets the first building block in the student leadership development process.

The Basic Science and Technology Academy of Research

The B STAR summer program was held for 5 weeks at the California State University, Chico and Long Beach campuses. Each student participated in classroom discussions, computer-assisted learning, and hands-on experiments. The focus of the Basic Science and Technology Academy of Research (B STAR) is to provide students with early exposure to the laws of physics and to give them the opportunity to learn how to build and troubleshoot computers. During the first portion of the day, the B STAR students participate and conduct a series of hands-on physics experiments guided by a lab manual developed specifically for this program. During the second part of the day, the *Mind Leader* computer-assisted program is utilized to help train the students on dis-assembling and re-assembling a computer and then running the various diagnostic tests to ensure that the unit is working properly. Each student was allowed to keep the unit that they personally built.

The students were given pre and post tests in physics to ascertain their improvement in understanding over the course of the program. At the beginning of the program the average score was $36 \pm 19\%$, indicating a definite need for exposure to the concepts of physics. The post test scores were significantly higher with an average score of $77 \pm 12\%$. During the computer technology portion of the program, each student was given an assessment test before the beginning of each module. The overall pre- scores were $61 \pm 18\%$ and the final scores were $91 \pm 12\%$. Additionally, the students' computers were periodically sabotaged to ensure that the students know how to run diagnostic tests and troubleshoot a computer. As part of an external evaluation process, a student was randomly selected at both sites to assemble and troubleshoot a computer with the evaluator observing. Despite minor assistance from a classmate in the south, in each case the student was successful and completely rebuilt the test computer.

Team Building and Professional Development Workshops in the B STAR Program.

During the B STAR program, time was taken for special activities. Field trips were taken to various industries including Conexant and Northrop Grumman. Presentations were also given by professionals from a variety of industrial backgrounds. The students also participated in personal statement, job interviewing, learning styles, and resume writing workshops. Several students worked together in the evenings through out the program to build a robot that could dance, sing and retrieve articles. They named this robot BLU.

Academic Excellence Workshop Training

An Academic Excellence Workshop (AEW) is a small community of students working collaboratively to master course material with the guidance of a facilitator. The AEW is designed

to give students the opportunity to enhance their learning experience for a particular course. The facilitator is trained to develop exercises that foster debate on key elements that have historically given students difficulty and impeded the learning process. AEWs are scheduled in conjunction with core technical courses. In October and January many of the B STAR students underwent advanced training to become AEW facilitators. These trainings were conducted by Dr. Sue Tappero (Cabrillo College), Dr. Derrick Booth (Butte College) and Valerie Roberts (College of the Siskiyous).

Conclusion

The first year of the B A STAR program was a successful one. The student evaluations and performances at each level were all very positive. The program qualitatively provided an overwhelming positive experience for the participating students. Most of the students had never been away from home for such an extended period of time (5 weeks), thus students received an early glimpse of what the transfer process will be like, both academically and for themselves and their family members. This is an especially vital point, as most participating under-represented students are first generation college students. Additionally, their self confidence was boosted, their communication skills were strengthened by presentation requirements, and teamwork and collaboration skills were practiced, all while fostering needed social skills. The expectation for each participating student was great, yet the students lived up to the expectations and delivered quality work resulting from serious dedication and effort. The Dean of California State University, Chico's School of Engineering- Dr. Ken Derucher, was present at the final closing and lunch. He was very impressed with the participating students and highly commended them on their summer work, their mature and focused dedication, and awarded transfer scholarships on site (2 awards).

At a recently concluded Leadership Development Conference, every indication shows that this next year will be another very strong year for the B STAR program. Work is nearing completion for the second phase, the implementation of 5 Advanced Science and Technology Academies of Research next summer.

Contact Information

Dr. Derrick W. Booth email address: boothde@butte.edu

Milton Randle email address: mrandle@fullcoll.edu

Lucy Casale email address: