10-27-2000

Recruitment and Retention of African American Females in High School Mathematics: Have We Achieved Results?

Sheryl McGlamery
University of Nebraska at Omaha, smcglamery@unomaha.edu

Carol Mitchell
Univeristy of Nebraska at Omaha, cmitchell@unomaha.edu

"RECRUITMENT AND RETENTION OF AFRICAN AMERICAN FEMALES IN HIGH SCHOOL MATHEMATICS: HAVE WE ACHIEVED RESULTS?"

Sheryl McGlamery, Ph.D.
Assistant Professor of Science Education
University of Nebraska at Omaha

Carroll Mitchell, Ph.D.
Associate Professor of Science Education
University of Nebraska at Omaha

"Our goal is to present the findings of the study and challenge the audience to consider the aspects of the program the researchers believe made the difference in recruitment and retention for these African American female students."

Introduction

This research report is designed to highlight the findings of one four year research project that succeeded in recruiting and retaining African American females in upper level mathematics classes. The recruitment and retention of African American females into predominately white upper level mathematics classes remains a challenge in many school settings. Most schools desire that more minorities participate, yet finding a successful formula often proves difficult and elusive. The following research project followed the progress of one such school, and a group of mathematics teachers who tried to change the view that higher mathematics wasn't for young women of color and succeeded.
Our goal is to present the findings of the study and challenge the audience to consider the aspects of the program the researchers believe made the difference in recruitment and retention for these African American female students.

Methodology

Classrooms are complex units of culture that encourage teachers and students to strive and make sense of their environment and to integrate personal knowledge and beliefs with new information. Interpretation and re-evaluation are on-going epistemological processes (VonGlasersfeld, 1989). The theoretical perspective is a constructivist one, whereby the views of the participants and their interpretations are most important.
The assumptions guiding this research are taken from an interpretive/qualitative perspective which assumes that perceptions are mediated by an individual's interpretations of experience. Erickson (1986) and Lincoln and Guba (1985) outline the techniques used in this research project which employed an ethnographic method to collect data. Most data was collected in the form of interviews with participants and field notes taken during classroom observations. Additional data was obtained in document form regarding the schools demographics, recruitment records and student enrollment figures.

Research Questions

The research questions we addressed were: 1) What were the constructs teachers found useful when teaching mathematics in a multicultural setting? 2) What components of the program designed did teachers and students find most effective in recruiting and retaining

African American female students in upper level mathematics courses? 3) What aspects of practice, beliefs and interaction patterns changed? 4) What impact did these changes have on student retention/performance?

Researchers' Role
The researcher in this study was a participant observer. She was involved in the field with teachers and students for four years. The prolonged engagement in the field allowed the researcher to access the "back-stage behaviors" and attitudes that best represent the true perspectives of the participants.

The Setting and Participants
The research involved the participation of fifty African American females enrolled in upper level mathematics grades 9-12 at an urban high school. Also participating in the study were five teachers at the same high school, all committed to increasing the participation and success of African American students.

Findings/Conclusions
The following assertions represent a summary of the findings. The program enacted by the teachers to target African American females required that a number of changes be made in their approaches. The reasons the changes in practice and beliefs occurred are the major focus of the presentation. It is the change in practice, perspective, attitude and beliefs on the part of the teachers and students that made the program a success. Specifically the students and teachers made the following changes in practice/beliefs/program:

Assertion I: Participation increased when students were recruited in cohort groups. The African American students were recruited individually for many years. While isolated students had succeeded in completing the upper level mathematics classes, the numbers remained depressing, because fewer than ~o African American females had completed through Algebra fl in three years.

The teacher participants noted that a school of predominately African American students should recruit and retain higher numbers of African American students in their upper level mathematics classes.

Since the one-one recruitment did not provide much success, the teachers decided to recruit students by cohort groups. The rationale for such a move was twofold. One, it would effectively reach more students, and two, it would target rising 9th graders to encourage African American students to begin studying mathematics at an earlier time. This would allow students who began Algebra I by 9th grade to finish Calculus by 12th grade.

The cohort group recruitment also gave the African American students a natural social group to belong too. Peer support was one area that African American students mentioned as being important to success. The students, who had been recruited alone, felt the lack of peer support and found it more difficult to persevere.

Assertion 11: Students found it beneficial to interact with role models whose careers required advanced mathematics.

The changes made to the mathematics curriculum were substantial. One main change was the introduction of a "meet the mathematician, engineer, scientist, or computer technologist." The mathematics and science departments got together to bring in a guest speaker once a month in one of the above professions to meet the students and talk about how mathematics and science are used in their jobs. Also many of the professionals were of African American descent.

The African American students found this aspect of the program very helpful. They were better able to connect with African American scientist, engineers and mathematicians who embodied their culture and attitudes, and thus project themselves into these new opportunities.

In addition to the "meet the professional program," students were encouraged to participate in a summer research program that allowed them to work with a scientist, mathematician, or computer scientist on actual research projects. This was also highly rated by the student participants as a way to experience different careers.

Assertion III: Students and teachers had to project themselves into the new future. Each group had to reconceptualize their roles and attitudes about teaching and learning mathematics.

Assertion IV: Teachers had to change their beliefs about teaching and learning; teaching had to become more student centered.

Assertion V: Changes in teaching practice were extensive and involved the addition of group based instruction and project oriented curriculum. Projects were tailored to student interests and abilities, including the integration of technology into most mathematics lessons.

Teachers in the mathematics department, in the past, viewed teaching as a subject-teacher-centered endeavor. They planned the lessons with the content at the center, not the students. Each mathematics class looked very much alike. The teachers typically lectured from the front of the room, either reviewing homework assignments or presenting new concepts. Irrespective of the students, all the focus was on the content delivery not student understanding.

The student role in the "old" mathematics classroom was one of the "passive learner." Students did not see a need to take an active role in their mathematics classes, with the possible exception of completing the occasional homework assignment.

In contrast, the "new" mathematics classroom emphasized student understanding and participation. Teachers began using small groups to facilitate problem-solving. Problems

were posed and students given class-time to discuss and research solutions. The addition of short term and long term mathematics projects and labs drastically changed the tenor of the classroom interactions. Teachers moved from didactic teaching or "teacher as director" to a new role of "learning facilitator." Students moved from passive learners to active participants.

Assertion VI: Major changes in the classroom culture were noted in classes most successful in retaining African American students in their classes.
The classrooms that were most successful in retaining African American students not only changed the focus of the curriculum, but the quality of the interaction
Assertion VII: Program components most successful, as reported by students and teachers were:
(1) cohort group recruitment, (2) small group projects, and student centered mathematics curriculum, (3) peer and teacher supported homework help line and center, (4) University/school partnership for students participation in research (involving science, math, or technology), and the (5) the career focus program designed to acquaint students with careers and professionals in mathematics, science and technology.
Impact

Our goal in presenting this research is to assist the audience in thinking about programs that are focused on retention and recruitment of African American youth. Further, we wish to stimulate ideas about ways in which we all can make a difference in the achievement of students of color.

References

Erickson, F. (1986). Qualitative methods in research on teaching. In M. Witrock (Ed.), Handbook or research on teaching, (3rd e([, pp.3-36). New York: Macmillan
Lincoln, Y., & Guba, E. (1985). Naturalistic inquiry. Beverly hills, CA: Sage Publications.
VonGlasersfeld, E (1989). Cognition, construction of knowledge, and teaching. Synthese 60 121-140.

Presenters:

Dr. Sheryl McGlamery is an Assistant Professor of Science Education at the University of Nebraska at Omaha She is currently involved in research focused on teacher induction/development with the CADRE project and multicultural issues in science and mathematics education.

Dr. Carol Mitchell is an Associate Professor of Science Education at the University of Nebraska at Omaha. Dr. Mitchell is also the Director and Co-principal investigator on the Banneker Project that focuses on the recruitment and retention of African American youth into science and mathematics.