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ABSTRACT

This paper on minority teachers in the field of mathematics begins with statistics on minorities in America, in order to put the problem of underrepresentation in perspective. It then showcases programs that appear to be successful in recruiting and/or retaining minorities in teaching mathematics at the school, college, and university levels. The paper stresses the need to increase the number of programs and the number of students served by these programs and specifies the need to maintain these programs over the long run. It offers recommendations to the Mathematical Association of America for developing strategies to attract and retain minorities. The paper calls for magnet schools for the teaching profession; intervention programs for school students interested in teaching mathematics; community college articulation programs in teaching mathematics; four-year college programs that are comprehensive in nature reflecting genuine concern, commitment, collaboration, and creativity in increasing the pool of minority teachers of mathematics; and special programs such as retraining programs. (Contains 19 references.) (JDD)

WHAT HAS BEEN DONE AND WHAT MORE MUST BE DONE TO RECRUIT MINORITIES IN TEACHING MATHEMATICS

Attracting Minorities into Teaching Mathematics Advisory Working Group Conference, Mathematical Association of America
Spelman College/Atlanta Marriott Marquis Hotel, October 23, 1992

Beverly J. Anderson, Professor of Mathematics, University of the District of Columbia

Introduction

I am pleased to be here today to speak on the topic, "What Has Been Done and What More Must be Done to Recruit and Retain Minorities in Teaching Mathematics." I believe that it is crucial for us to explore this topic thoroughly and at this time in our history, before the shortage of Black, Hispanic and American Indian teachers of mathematics becomes a crisis in America.

In realizing the dearth of minorities as secondary school teachers of mathematics and the possible reasons for it, several programs have been developed to increase the pool of minority teachers of mathematics. The need to increase this pool is serious today in view of the wide disparity between the supply of minority teachers of mathematics and the proportion of minority students in virtually every state in the United States. Not only is it important to ensure that minority students have an opportunity to be taught mathematics by minority teachers, specifically Black, Hispanic and American Indian teachers, during their high school years, but it is equally important for majority students to be taught by minority teachers from these ethnic groups in order to eliminate some of the stereotypes associated with "who can do mathematics." According to the American Association of Colleges

for Teacher Education, "A quality education requires that all students be exposed to a variety of cultural perspectives that represent the nation at large. Such exposure can be accomplished only via a multiethnic teaching force in which racial and ethnic groups are included at a level of parity with their numbers in the population."

Programmatic activities aimed at producing minority teachers target various groups of potential teacher candidates. These activities include: programs at the pre-college level; articulation programs between two- and four-year colleges; baccalaureate degree programs, and programs for retirees and/or career changers. The goals of these programs, generally, are: 1) to stimulate the interest of minorities in the teaching profession, particularly in teaching mathematics; 2) to provide incentives (including financial aid) for promising minority students to become teachers of mathematics; 3) to prepare minorities to teach mathematics in urban school districts, and 4) to provide a supportive environment to make it possible for minorities to be successful in undergraduate programs in mathematics education. These programs have been developed by schools, colleges and universities, private and public agencies, professional organizations, and etc. concerned about increasing minority secondary school teachers of mathematics.

In preparing this presentation, it became clear to me that a comprehensive in-depth study should be commissioned to determine what has been done, nationally, to recruit minorities in teaching mathematics, and the effects of those efforts. However, today I

will showcase a few programs that appear to be successful in recruiting and/or retaining minorities in teaching mathematics at the school, college, and university levels. This paper will also stress the need to increase the number of programs and students served by these programs, and will specify the need to maintain these programs over the long run, as there is no quick-fix to reversing current trends in this area. Finally, recommendations on other strategies to be taken to attract and retain minorities in such programs will be proffered.

Background

To fully appreciate what has been done and what more must be done to recruit and retain minorities in the teaching force in mathematics, we must take a close look at some statistics on minorities in America, and put the problem of underrepresentation in perspective. Some of these statistics bring to bear the need to address multiple societal problems and to provide better educational opportunities for racial/ethnic minorities at the elementary, secondary, and college levels as we set out to increase the minority mathematics teaching force.

- Although Blacks, Hispanics, and American Indians make up about 22% of the total population in the U.S. (12.1% Blacks, 9% Hispanics, and 0.8% American Indian) and about one third of the public school population, these groups make up about 11% of the teacher population, and only 6 percent of the high school teachers of mathematics, in grades 10-12 (CCSSO, 1990). There is no evidence that

the percentage of minority teachers will increase in the near future. In 1989, for every 439 students enrolled in teacher education programs nationally, there were 28 (6.4%) Blacks, 11 (2.5%) Hispanics, and 2 (0.4%) American Indians.

- According to 1990 Census data, from 1980 - 1990, the minority population grew significantly faster than the majority population. During that period, the White population grew 6%, the Black population grew 13%, the American Indian population grew 37.9%, and the Hispanic population grew 53%. This trend is continuing in the 1990s.
- Blacks, Hispanics and American Indians make up approximately 90% of America's minorities.
- The ten largest school districts in the nation are 70% Black and Hispanic (Carl, 1990)
- Twenty-two of the 25 largest city school districts in the nation are predominately minority. (QEM, 1990).
- According to a July, 1992 press release from the Children's Defense Fund, approximately 39.8 percent of all Black children, 32.2 percent of all Hispanic children, and 12.5 percent of all White children live in poverty. In 1991, Sam Husk, Executive Director of the Council of Great City Schools, reported that approximately 60 percent of the children in urban schools live in poverty.

- Approximately 50% of the minority students in undergraduate institutions are in two-year colleges. However, the transfer rate of minorities from two-year to four-year institutions is 10% to 15%.
- 15% of all Black students and 36% of all Hispanic students, nationally, drop out of high school.
- In 1988, Black enrollment in four-year institutions was 8%, Hispanic enrollment was 3.6% and American Indian enrollment was .5%.
- In 1989, Blacks and Hispanics earned only 8.6% of all bachelor's degrees.

By the year 2000, when roughly one-third of the nation will be minority, a majority of the current school teachers will be included in the senior age group (45-67). However, the pipeline in teacher education programs suggests that we will have an insufficient pool to replace the aging faculty, and the proportion of minority elementary and secondary school students is far greater than that of the future teaching force. The question of how to get more minorities in the teacher pipeline, and specifically the teacher pipeline in mathematics, is of major concern as we approach the 21st Century.

It is important to note here that many mathematics departments in our colleges and universities perceive school teaching and school teachers in a less than favorable manner. I am afraid that this elitist attitude has affected the number and the quality of students that have sought careers in the teaching of mathematics in

the schools. No longer can we tolerate the old adage that "those who can do and those who can't teach." We simply cannot afford to think in that vein. Of course, many options are open to the mathematics major, and many options will continue to be open to that major; however, teaching may be the option with the greatest impact. Mathematics professors can no longer decry the teaching profession for any other profession requiring a firm background in mathematics. Rather, we must look at school teaching as an honorable profession, and must particularly look at school teachers of mathematics with respect, as these teachers will have a major responsibility in developing the workforce of tomorrow.

The above mentioned statistics on some minorities suggest several possible reasons for the low number of minorities receiving baccalaureate degrees, especially in teaching mathematics. These statistics suggest that poverty, lack of school preparation in mathematics, lack of role models, and persistence in school may be critical factors to consider as we develop programs to reverse trends of underrepresentation. These factors and others will be addressed in subsequent presentations, so I will not discuss them here. However, I would like to say a few words about effective schools, comprehensive college programs, and financial need.

To increase the number of minorities in the teaching profession in mathematics, we must address how to get minorities prepared for college, and how to keep them in college programs leading to the baccalaureate degree in mathematics education. We must advocate stronger school programs in mathematics for all

children, especially for minority children. We must also be mindful of the characteristics of school and college programs wherein minorities have been successful. The literature shows that minority students have been successful in schools where there is strong leadership, high expectations for them to achieve, and when teachers believe that they can and must learn. They have also been extremely successful in comprehensive college programs that usually include special admissions programs, adequate financial aid, sensitive academic and personal counseling, pre-freshman summer programs, tutoring and remedial instruction (when necessary), and an affirmative atmosphere. Comprehensive programs are commonly seen at minority institutions, and these institutions have produced the lion's share of teachers of mathematics. The literature also suggests that many minority institutions are in financial jeopardy; therefore, America cannot continue to depend on this group of academies to produce the glut of minority teachers, especially minority teachers of mathematics.

Financial aid is critical to minority participation in higher education because of the large population of minorities living in poverty. Not only do these students need grants and loans, but they also need a mechanism to know about what is available financially to support their college education. Talent Search and Educational Opportunity Centers, the only federal post-secondary recruitment and information mechanisms, were key programs for increasing minority enrollment in the 60s and early 70s by offering financial aid information, post-secondary counseling, and encouragement to

these students. While the number of minority students, particularly from low-income families, has been increasing, funding for Talent Search and Educational Opportunity Centers has not expanded to keep pace with the increased number of eligible students. In fact, fewer students are served today by these programs than were served a decade ago. Hence, many Black, Hispanic, and American Indian students, whose decision to go to college is contingent upon financial assistance, are simply unaware of the availability of financial aid.

We should note that the College of Education at the University of Florida recognizes the need to provide financial support to minority students. As a result, the college has set up a program to help minorities who need extra financial or academic support as they pursue degrees in education. The program is one of several funded through a $97,000 grant from the Ford Foundation.

Our challenge, then, is to use our knowledge of the factors impacting minority participation in college, particularly in teacher education programs in mathematics, as we devise programs to direct who we educate to fill the teaching needs in our schools. Today's teacher education majors must have specific socio-economic experiences to prepare them to teach in low-income schools, where the majority of the students come from diverse races, cultures, and language groups. The diversity of the student body will become more pronounced in the 21st Century; therefore, it is prudent for America to look more seriously at ways to educate minorities to teach in today's and tomorrow's schools. Bearing in mind the

diversity of our society and the attendant societal problems, including the impact of poverty, we must figure out how we are going to sow the seeds in our schools so that minorities will want to become teachers of mathematics. We must determine how to fertilize those seeds in intervention programs and in our two- and four-year higher education institution programs, and how to monitor the growth of our harvest during the first years after graduation from the university.

I am happy to report that at some schools, colleges and universities, public and private agencies, and professional organizations have invested considerable time in responding to the need to increase the teaching force in mathematics. If more institutions develop similar programs to address this need, perhaps we will see significant growth in the minority mathematics teaching population in a decade. I will now share information on some of the efforts initiated in the schools, colleges, and universities, as well as efforts initiated by other institutions.

What Exists for Pre-College Students

There are several programs for **school students** designed to stimulate interest in mathematics teaching on the secondary level. Some of these programs are based on college campuses while others are magnet school programs. Dr. Betty Clark has already told us about the Summer Camp Opportunity for Potential Educators (SCOPE) Program which she developed at Clark Atlanta University, explicitly designed to stimulate student interest in the teaching of mathematics and science. In its two-year existence, the program,

funded by the Department of Education's Fund for the Improvement of Post Secondary Education (FIPSE), Exxon Education Foundation, and General Mills, has served 100 students.

Calvin Coolidge High School in Washington, D.C., The Crenchaw Training Academy in Los Angeles, California, and the Austin High School for the Teaching Professions in Houston, Texas, have developed college preparatory programs for students interested in the educational profession. These four-year magnet school programs include specially designed education courses emphasizing pedagogy, teaching methodology, and practice. The Stephen F. Austin School's magnet component, called the High School for the Teaching Professions, is the oldest of the magnet school programs and was started in 1982. According to the program counselor, Mrs. Sandra Lutte, The High School for the Teaching Professions serves 150 - 200 students, annually, of which approximately 10% focus on mathematics teaching. Nearly 90% of the students are Hispanic, Black, Asian, and American Indian, and about 70% of these students go into teaching majors at colleges and universities, mainly in the state of Texas. Of note is that in their senior year of high school, a two-hour block of school time is set aside for internships in the schools. They are assigned to assist mentor teachers and are paid for their work by the Houston Independent School District. The Director of the program is Mrs. Dottie Bonner.

The magnet program at Calvin Coolidge is five years old and serves about 120 students each year. Approximately 30% - 40% of these students are interested in becoming secondary teachers of

mathematics. The program director, Mrs. Christine Easterling, stated that high achieving students are recruited for this program and are encouraged to pursue mathematics and science teaching. The program is structured similar to the Austin program, except that students are not paid for assisting mentor teachers in their senior year. (For more information about these programs, call Austin High School for the Teaching Professions, 713-923-7751; Coolidge High School, 202-722-1656; and Crenshaw Training Academy, 213-926-5370).

The **Upward Bound Math and Science Initiative** is noteworthy for this discussion because it encourages minority students to receive the academic background in high school to make it possible for them to survive in a college curriculum leading to a degree in a mathematics-based field, including mathematics education. Students are encouraged to pursue the more rigorous courses in mathematics and science while in high school. The program aims to help students develop the academic skills and motivation that will enable them to finish high school and pursue a degree in mathematics or science at a postsecondary institution. These degrees could include mathematics teaching. Participants must be rising sophomores and have completed at least one math and science course in their freshman year of high school. This four-week federally funded program caters to students interested in pursuing math and science careers and who live in the states of Kentucky, Tennessee, North Carolina, South Carolina, Mississippi, Georgia, Florida, and Alabama.

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minority, a majority of the current school teachers will be included in the senior age group (45-67). However, the pipeline in teacher education programs suggests that we will have an insufficient pool to replace the aging faculty, and the proportion of minority elementary and secondary school students is far greater than that of the future teaching force. The question of how to get more minorities in the teacher pipeline, and specifically the teacher pipeline in mathematics, is of major concern as we approach the 21st Century.

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Two-year College Articulation Programs

Two-year colleges are becoming more active in developing articulation programs to prepare students from underrepresented groups for careers in teacher education. While the thrust of these programs is to do the best job possible to increase the number of minority teachers, often they encourage students to go into areas such as mathematics teaching where the need is greatest. So to that degree they can be listed among the programs that attract minorities in mathematics teaching. It is instructive, however, to examine successful articulation teacher education models in general, in order to glean what could be done with a specific focus in mathematics. We should note here that in Florida, where higher

education articulation is state-mandated and controlled, approximately 49 percent of the state university students enrolled in teacher training programs attended a community college. We should also note that articulation programs between two-and four-year colleges are successful when courses have common prerequisites, content, and credit value, and when there exists dual admissions to facilitate transfer and degree achievement.

Three community college models will now be discussed briefly in this presentation: The Urban Teacher Program, The Teacher Leadership Consortium, and the Minority Teacher Preparation Program. These programs not only focus on the need to increase the pool of minority teachers of mathematics, but they are also successful articulation models.

The **Urban Teacher Program (UTP)** provides a community college articulation model at Wayne County Community College, Eastern Michigan University (EMU), and Wayne State University. These higher education institutions have joined forces with the state department of education and three urban school districts to sponsor this program. The UTP allows students to earn an associate's degree at Wayne County Community College, then complete their bachelor's degree requirements as students at Eastern Michigan University (EMU) or Wayne State University. The program places emphasis on field work and mentor relationships. Mentor teachers are identified by school principals as outstanding teachers, and students work with these mentors one-on-one. They are also given

many opportunities to observe their mentor teachers in action. To participate in the program through all four years, students must follow a **mathematics**, science, or bilingual education track. If a student chooses another area or specialty, he or she must apply to the upper division institution independently. **This requirement was initiated to ensure that teachers were being trained in fields with the most critical shortages.** A less formal criteria for admission to the program is the desire to teach in an urban setting.

Currently, about **160 students** are enrolled in the program. Although the program offers no financial assistance, students can participate in paid internships in their junior year. With approval from faculty and staff, they may also do unassisted substitute teaching, and may earn an honorarium for a student teaching practicum.

The Teacher Leadership Consortium (TLC) project is a collaborative effort between Cuyahoga Community College in Cleveland, Ohio and Kent State University. The purpose is to prepare students from underrepresented groups for careers in the teaching profession. In addition to the identification and selection of capable candidates, this project also addresses other related issues, including transfer of credits, academic and social support systems, as well as financial aid. The program provides academic and counseling support through cohort groups at Cuyahoga and Kent State. Most students selected to participate have completed an associate's degree from Cuyahoga. Although more than 150 students from groups traditionally underrepresented in the

teaching profession applied to the program, only 29 were selected in the first two years of the program. Once they transfer into the University, they enroll in a variety of teacher education programs, such as elementary education, **secondary education** and special education. They will become certified once they satisfactorily complete the bachelor's degree requirements at Kent State and the National Teachers Examination.

Thoughtful selection procedures and campus-based academic and student support systems are intended to encourage students to stay in the program and graduate so they can begin teaching careers. Agreements are being formalized with Ohio school districts to facilitate both hiring of the graduates and ongoing professional development support.

The Minority Teacher Preparation Program was instituted at the University of Wisconsin-Whitewater to increase the number of minority students eligible for teacher certification and teaching positions in Wisconsin by improving the rate of transfer of minority students and their successful completion of teacher education programs. A cooperative agreement between the colleges outlines their commitment to assisting two-year college students interested in teaching to complete the associate's degree; intensifying academic and financial support for these students; coordinating the transfer of academic courses to UWW; concurrently admitting teaching education majors at both institutions; and promoting student interactions with successful minority teachers

and administrators.

Four-year College Programs

Several programs exist at baccalaureate granting institutions to increase the pool of minorities in teaching mathematics. Some of these programs have outstanding recruitment strategies including scholarship incentives, special courses, and seminars. Some four-year institutions have developed retraining programs to prepare out of field teachers to teach mathematics. Five programs will be discussed in this section: The Philip Morris program, and programs at the University of the District of Columbia, Xavier University, University of Oregon, and Cornell University.

The **Philip Morris Minority Teacher Program** operates in the states of California, Colorado, Georgia, Illinois, Kentucky, New York, North Carolina, Texas, and Wisconsin. The initiative provides **$5,000 scholarships** to 76 minority students in their junior year of college who are nominated by their school as strong teacher prospects. The program is administered by the Foundation for Independent Higher Education, which is directed by Keith Henry.

Both the University of the District of Columbia (UDC) in Washington, D.C. and Xavier University in New Orleans, Louisiana have developed retraining programs designed to prepare out-of-field teachers to become secondary school teachers of mathematics. Upon completion of these programs, usually including 18 - 24 hours of mathematics and 6 - 18 hours of education, the teacher receives the Master of Arts degree in Teaching, and joins the ranks of the minority teachers of mathematics. Sister Theresa Durapau is the

Chairman of the Department of Mathematics at Xavier University and Dr. Charles Sevick, is the director of the retraining program. Dr. Beverly Anderson developed the Retraining-Recertification Program at the University of the District of Columbia. (For further information, call Xavier University, 504-483-6443 and UDC, 202-282-3171.)

The University of Oregon has developed a statewide effort for recruiting secondary junior and senior minority students into the College of Education. A brochure is distributed to all minority students who took the SAT test and all community college and high school counselors throughout the state. Special recruiters from the College of Education also travel to schools with large minority populations. In 1987, Oregon initiated a tuition waiver program for minority students attending state colleges and universities.

Teaching for the 21st Century: a Career Exploration Workshop is a four-day seminar at Cornell University, designed to encourage more minorities to enter the teaching profession. Students of color from 15 colleges and universities around the country are brought together to examine assumptions about the teaching profession. They listen to educators discuss multicultural curricula, alternative education programs and differences in learning styles. The group visits a community center to talk to students about their experiences and puts theory to practice through experimental workshops in which they each play the role of teacher. The program, funded by the Andrew W. Mellon Foundation, is free. Travel and accommodations are included as is a small

stipend.

Other Programs

The **Search for Excellent Leaders to Enter Careers in Teaching (SELECT)** is a three-way collaborative effort among White Plains public schools, Westchester Community College, and Pace University in New York. Recruitment efforts are focused not only on minority college-bound high school students and community college students, but also on minority adults seeking mid-life career changes. The project features a team-taught course entitled, "Introduction to Schools and Teaching," which is offered through the collaboration of Westchester Community College and PACE University.

The **National Executive Service Corps (NESC)**, a nonprofit organization, recruits and prepares retired military and professional personnel to become teachers in schools in New York City. NECS identifies qualified minority candidates interested in science and mathematics by contacting various professional organizations' membership list of retirees. Program participants take a sequence of education and content courses tailored to their individual needs at SUNY-Brooklyn College. The courses satisfy certification requirements for New York State that enable the program participants to teach once the program is completed. (For more information, call 212-529-6660).

Conclusion

Clearly there is no quick fix to increasing the pool of minority teachers of mathematics. There is a serious need to increase the number of programs and students served by these

programs, as well as to coordinate the effort. Broad-based commitment is needed from all segments of society to increase the supply of minority teachers, especially teachers of mathematics. Magnet schools for the teaching profession; intervention programs for school students interested in teaching mathematics; community college articulation programs in teaching mathematics; four-year college programs that are comprehensive in nature reflecting genuine concern, commitment, collaboration, and creativity in increasing the pool of minority teachers of mathematics, and special programs such as retraining programs are some of the ways that America could reverse the trend of underrepresentation of minorities as teachers of mathematics. More of these efforts are needed for racial and ethnic groups to be included on a level of parity with their numbers in the population. However, before any of these programs can be truly effective, the value placed on the teaching profession, evidenced by prestige and remuneration, must be raised to make teaching a viable career choice.

I have listed ten recommendations for you to consider as we set out to explore strategies to increase the pool of minorities seeking careers as mathematics teachers.

Recommendations

1. MAA should advocate publicly their commitment to promoting programs to increase the pool of minority teachers of mathematics.
2. MAA should advocate publicly the creation of intervention programs for minorities, similar to the program at Clark

Atlanta University, to stimulate their interest in teaching mathematics.

3. MAA should launch a mass media campaign to show minority mathematics teachers in a positive light, while conveying that good teachers of mathematics are needed throughout the country.

4. MAA should join forces with NCTM to create a national Future Teachers of America Club for minority high school students, and could seek funding to sponsor annual meetings of this club. These clubs could be active in high schools.

5. MAA should seek funding for scholarships, financial aid and/or forgivable loans for capable high school students who wish to become trained as secondary school teachers of mathematics. Loans could be forgiven if the "new" teacher actually teaches for a prescribed number of years in the public schools.

6. MAA should join forces with AMATYC to encourage the creation of more articulation programs between two-and four-year institutions to increase the minority mathematics teaching force.

7. MAA should advocate the development of support programs for minority college students enrolled in teacher education programs in mathematics to strengthen their skills once they are admitted into the teacher education program. Oftentimes, when instruction is complemented

with support services good to excellent teachers are developed.

8. MAA should make a concerted effort to improve how mathematics is taught on college campuses and to increase the number of students successfully completing mathematics courses. Too many students are failing mathematics in college.

9. MAA should promote curriculum standards, expressing the need for all school students to master a core of knowledge in mathematics. This would ensure to some degree, minority students having a sufficient background in mathematics for immediate entry into a mathematics education college program.

10. MAA should highlight four-year institutions that are working cooperatively with two-year institutions in implementing articulation programs aimed at increasing the pool of minority secondary school teachers of mathematics.

The above are but a few of the actions that MAA could take to attract minorities into teacher education programs in mathematics, and to retain them in those programs.

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