

# African-American Women in Mathematics

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### Teacher-Student Relationships

*Literature Review* - African-American students learn from direct contact with teachers and peers, taking a holistic relational, and intuitive stance.

Teachers of African American students have to be more than effective teachers. Instead, they must also be "culturally responsive teachers who contextualize teaching by giving attention to immediate needs and cultural experiences of their students." (Irvine, 1992, p.82)

*Expert interviews* – Set them up as leaders in the class room. "If you will try, you will pass."

*Student interviews* - Examples of good and bad teacher student relationships.

➤ She asks a lot of questions, teachers laugh and ask "Why would you ask that?" They don't like that, It's frustrating for them.

➤ Wishes teachers would consider everyone and make sure they understood, instead of moving on.

➤ Math teacher was very energetic, animated, passionate, and interesting. Student doesn't like math but teacher made it more interesting and was very encouraging. Student wouldn't have been as engaged, was in teacher's office every day.

➤ Geometry teacher, made it seem simple, broke it down. Could go over their tests, and he was more encouraging. Laid back teacher, if you wanted to learn, she was there, and became friends.

Irvine, J.J. (1992) Making teacher education culturally relevant. In M. Dilworth (Ed.), *Diversity in teacher education: New expectations*. (pp.79-92) San Francisco, Jossey Bass.

### Preferences for Learning Math

*Literature Review* - Mathematical Literacy – An individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgments, and to use and engage with mathematics in ways that meet the needs of that individual's life as a constructive, concerned and reflective citizen. [OECD's Program for International Student Assessment (PISA, 2000)]

"African American students usually learn in ways which are characterized by social and affective emphases, harmony with the community, holistic perspectives, field independence, expressive creativity, and nonverbal communication." (Stiff, 1990)

*Expert interview* – "Math is a very sequential based content area and if there are any gaps it makes it difficult."

"People forget the mathematical formula because they haven't been able to build it into a context of something useful in their life, so they lose it."

*Student interviews* – Need applications to the real world and fun teachers.

"I like to use the book as a secondary source, so if I don't understand the lesson I'll go home and look in the book, and examples in the book."

Wants teaching to come from outside the book, "I think that would help, like having other activities."

Programme for International Student Assessment (PISA). Organization for Economic Cooperation and Development (OECD), 2000.

Stiff, Lee V. (1990). African American students and the promise of the curriculum and evaluation standards. In 1990 NCTM Yearbook *Teaching and learning mathematics in the 1990s*. (pp.152-58) Reston VA, NCTM

### Themes

From interviewing 6 women Summer Academy and REAL Program participants from Summer 2008 and 2 researchers and principals from colleges and high schools the following themes were identified:

**Teacher Student Relationships**  
**Parental Involvement**  
**Preferences for Learning Mathematics**  
**Lack of Role Models**  
**Self Confidence**

## Why African-American Women Are Not in Mathematics

### Purpose

As an African American woman studying mathematics I have noticed the lack of other African American woman in my math courses. Even though the number of African American men in these courses is very small as well, it is still significantly larger than that of women. I am curious and excited to find out why this occurs. Since there continues to be studies that show the same trends of African American students falling behind their peers when it comes to mathematics I believe that there are answers to why this occurs and what can be implemented in the classroom to change these statistics (Ambrose, Levi, and Fennema, 1997).

### Research Questions

Over the summer I took the time to explore a research question which really interested me. The question of interest: What factors influence African American woman to shy away from mathematics in college? A second question of interest looks at families, friends, and media and their influence on the choice of a college major for African American women. Lastly what do African American women need in order to be successful in mathematics.

### Methodology

The African American Women in Mathematics Project uses qualitative methods to examine factors influencing the choice of college major by African American women and family influence of major. I created a list of interview questions that I asked several African American women involved in the REAL Program and Summer Academy. This data heavily supported the literature that I read as well as did interviewing professionals in the math and/or education field.

Ambrose, R., Levi, L. & Fennema, E., (1997). The complexity of teaching gender equity. In multicultural and gender equity in the mathematics classroom: The gift of diversity. (pp.230 – 235) NCTM 1997 yearbook. Reston VA, NCTM.

### Conclusions

If I could change the way African American students are taught mathematics, I would:

- Provide appropriate role models for African American students (from industry and higher ed).
- Use different approaches in class to accommodate African American student learning styles.
- Support and develop parental involvement in class and with homework.
- Stress positive feedback on advances in mathematics learning by students.
- Educate teachers through workshops on motivations, conversation styles, and social preferences of students.

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**Denise Dieffenbach, Multi-Cultural Student Services**  
**Dr. Brenda Tiefenbruck, MaRC Director**

### Parental Involvement

*Literature Review* – "In particular, many urban African American parents usually work during school hours and have a very hard time trying to get work off in order to participate in their child's school functions." (Strutchens, Thomas, and Perkins, 1997)

*Student interviews* – Parent attitude and involvement encouraged and motivated to do well in math.

➤ Dad said "Math and English are most important" studied in Africa. He would help her and if he couldn't he would take her to the library, wouldn't let her give up.

➤ Her parents were really strict with school, wanted her to get A's in everything. They would show more happiness when they see A's. "Especially with math and science, they've always been really strict, you have to get A's in math and science." In her culture you are expected to be an engineer or doctor.

➤ Parents always pushed her to learn. Her dad always said "Without an education you're not going to get far."

➤ Parents pushed her to challenge herself, didn't understand the math so she turned to brother, but surpassed him so she was on her own. More encouraging for math/science. Encouraged her to go past the requirement.

Strutchens, M., Thomas, D., & Perkins, F.D., 1997. Mathematically empowering urban African American students through family involvement. In multicultural and gender equity in the mathematics classroom: The gift of diversity. (pp.230 – 235) NCTM 1997 yearbook. Reston VA, NCTM.

### Self Confidence and Lack of Role Models

*Literature Review* – African American students are affected by culture related to mathematics learning. Students' self perceptions as members of the mathematics community are shaped by culture. Also, since cultural and academic knowledge are oppositional, students' indigenous skills are not valued. (Bogdan and Biklen, 1998).

African American students dissociate from the learning process as a result of becoming vulnerable to the stereotypes and internalizing the failing expectations of them in mathematics. (Spencer, Steele, and Quinn, 1999).

*Expert interviews* – Principal of 22 years had never interviewed an African American woman wanting to teach math. If we have students who are underrepresented in total in our educational system, taking one of the hardest areas that we have would make it even more challenging.

*Student interviews* – One mother of a student was the only role model. Mostly unconfident in mathematics.

➤ "I've never been confident with math and I think that affects how I do. I think that I would do better if I was more confident. In math I feel like I'm the stupid one."

➤ Her mom is her role model for math, dad is a veterinarian. Rates herself an 8.5 because if she is taught well then she will do well. [rating scale from one to ten]

Bogdan, R.C. & Biklen, S. (1998). Qualitative Research in Education. An Introduction to Theory and Methods. (3rd Ed.) Boston, Allyn & Bacon.

Spencer, S.J., Steele, C.M., & Quinn, D. M. (1999) Stereotype Threat and Women's Math Performance. Journal of Experimental Social Psychology (35, 1)