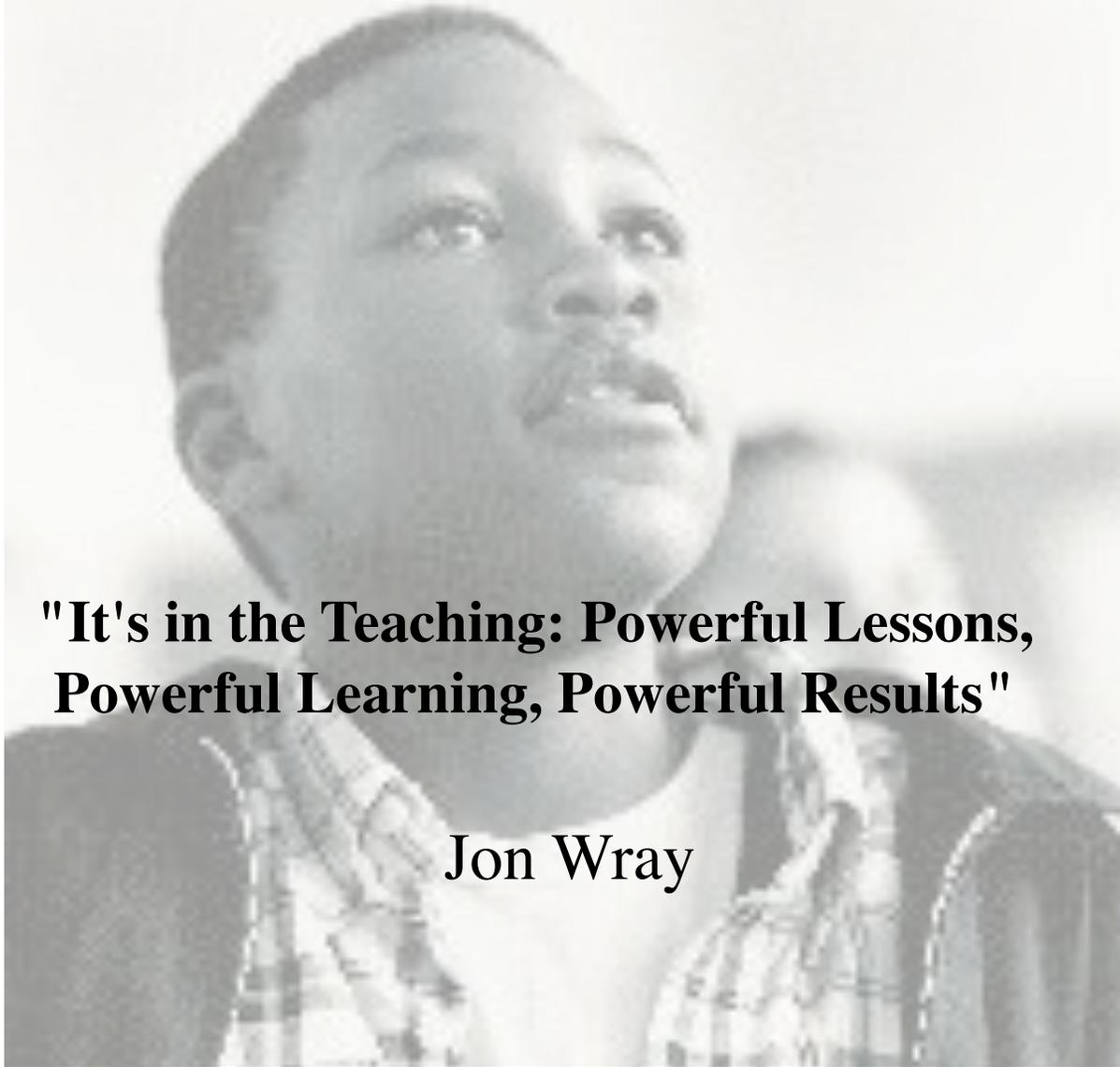


# **Increasing the Mathematical Proficiency of Underachieving African American Males**



**"It's in the Teaching: Powerful Lessons,  
Powerful Learning, Powerful Results"**

Jon Wray

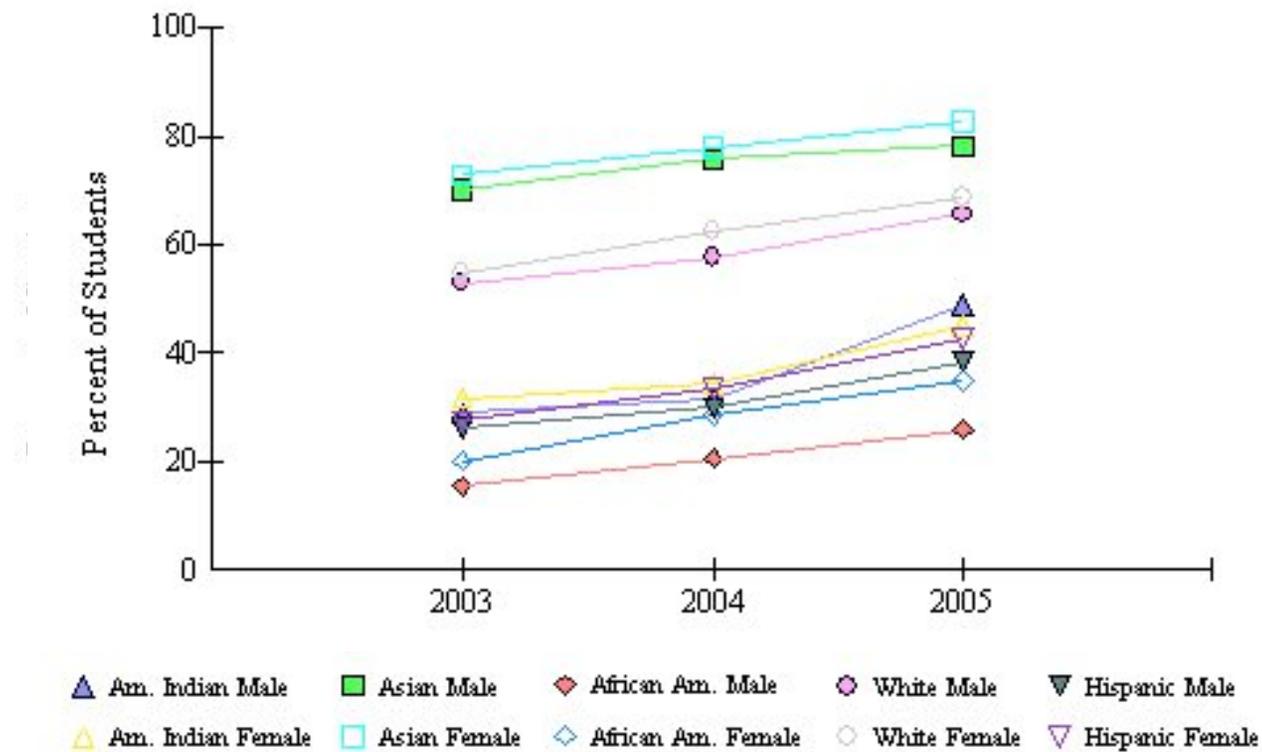
# Session Goals

- Review some of the causes of and data that supports the existence of the Achievement Gap in mathematics.
- Explore strategies to help create a learning environment where students are able to find and justify their solutions, question other students, and communicate their responses to the same or different questions.
  - Use of words AND numbers AND pictures AND... (instructionally).
  - Develop student-friendly translations for the “Verbs of Doing Mathematics”.
  - Learn about research-based models for encouraging/improving the verbal discourse and written communication of underachieving African American males.
  - Explore the benefits of using the strategy of “Play-Acting” to improve student understanding of mathematics problems.
  - Explore some of the appropriate uses of computer technology to enhance the processe(s) of communication/representation by underachieving African American Males.

“Our schools have changed since  
1954 and *Brown v. Board of  
Education of Topeka*;  
generally,  
our mathematics classrooms  
have not.”

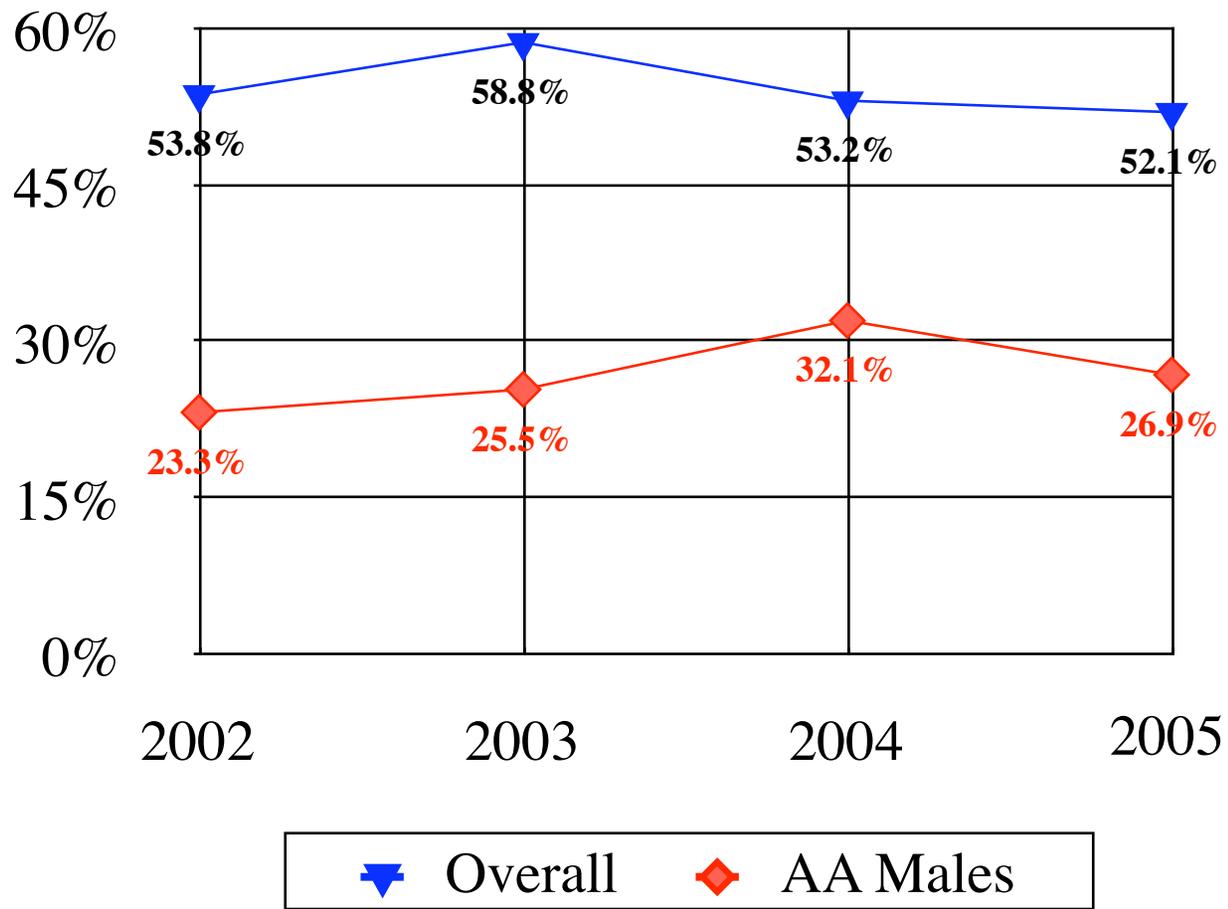
Dance, R., Davidson, N. and Wingfield, K. (2000). A high level of challenge in a collaborative setting: enhancing the chance of success for african american students in mathematics. *Changing the Faces of Mathematics: Perspectives on African Americans*. NCTM. 33-50.

**MSA for Race/Ethnicity and Gender:  
Advanced + Proficient Grade 8 - Mathematics**



Source: <http://mdk12.org>

## Algebra HSA: Percent Passing Overall vs. African American Males



How many African American males were left behind in MD public schools last year?

- **77,328** African American Male Mathematics MSA Test-Takers in 2005
- **33,690** scored Proficient + Advanced
- **43,638** (56.4%) scored **Basic**

# Low-Track Classes



- **African Americans** and other ethnic groups are the predominant groups placed in lower-level academic classes.
- Students in these classes often receive substandard mathematics instruction.

Oakes 1990; Slavin 1987

# Other Factors

- Focus on basic skills, low expectations, and the least-qualified teachers (Heubert & Hauser 1999).
- Low achieving students then fall further behind rather than acquiring increasingly high level knowledge and skills.
- Tracking contributes to low math performance rather than addressing it (Kifer, 1993; McKnight 1987; Oakes, Ormseth, Bell, & Camp, 1990).

# Mastering the “Basics”

“The view that most people have limited ability to learn mathematics may be tied to the widely held belief that *students must master all the ‘basics’*--typically defined to be sets of arithmetic facts and procedures--before attempting to solve challenging mathematical problems or studying other areas of mathematics (e.g., algebra, geometry, measurement, statistics, etc.).”

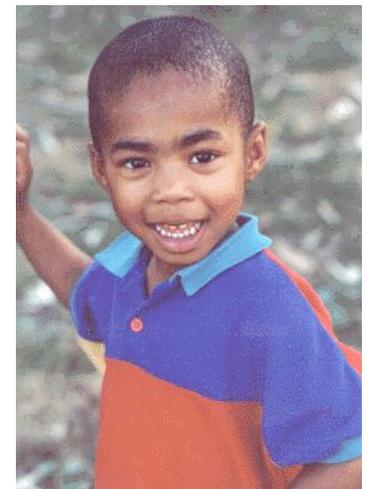
# Mastering the “Basics”

**“Contrast this view of mathematics with the way that society views literacy. There is a core belief that everyone can learn to read and write in English, and a failure to do so is viewed as socially unacceptable. *But few would argue that students must master all of the basics of grammar, punctuation, and spelling before ever reading a novel or writing a poem.*”**

# Research on Better Schools

“Research on accelerating instruction supports the premise that an enriched, accelerated curriculum does *more* than a low-track, remedial curriculum to enhance the performance of low achievers and students who are at risk of failure.”

- Bloom, Ham, Melton, & O'Brien 2001; Levin 1988; Peterson 1989



# Teacher Content Preparation



African Americans are less likely to have teachers with strong mathematics content knowledge.

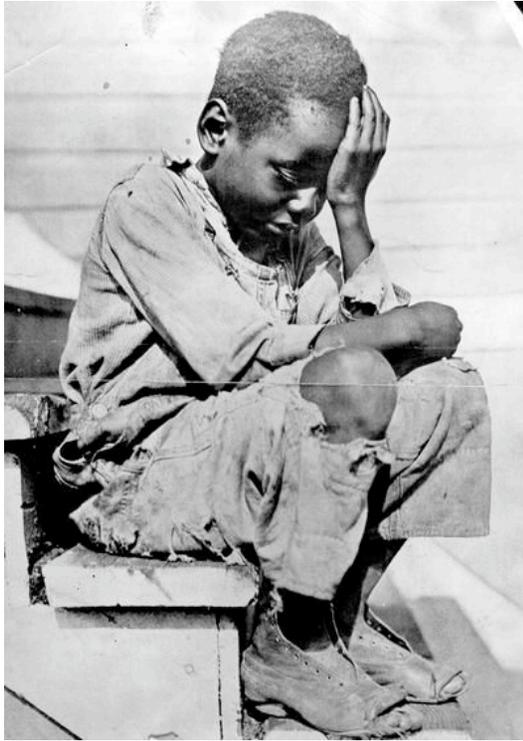
- 47% of mathematics teachers of classes with high-minority enrollment had a degree in mathematics or mathematics education.
- 60% of teachers in mathematics classes with less than 10% minority enrollment had a degree in mathematics or mathematics education.

Weis, Iris. (1994) A profile of science and mathematics education in the united states. Horizon Research. Chapel Hill, NC.

# Good Teaching Matters - *A LOT*

- The average math scores of a group of Dallas 3rd graders who were assigned to three highly effective teachers in a row rose from the 55th percentile to the 76th percentile by the end of the fifth grade.
- By contrast, a slightly higher achieving group of third graders were assigned three consecutive ineffective teachers and fell from the 57th percentile to the 27nd by the end of the fifth grade.

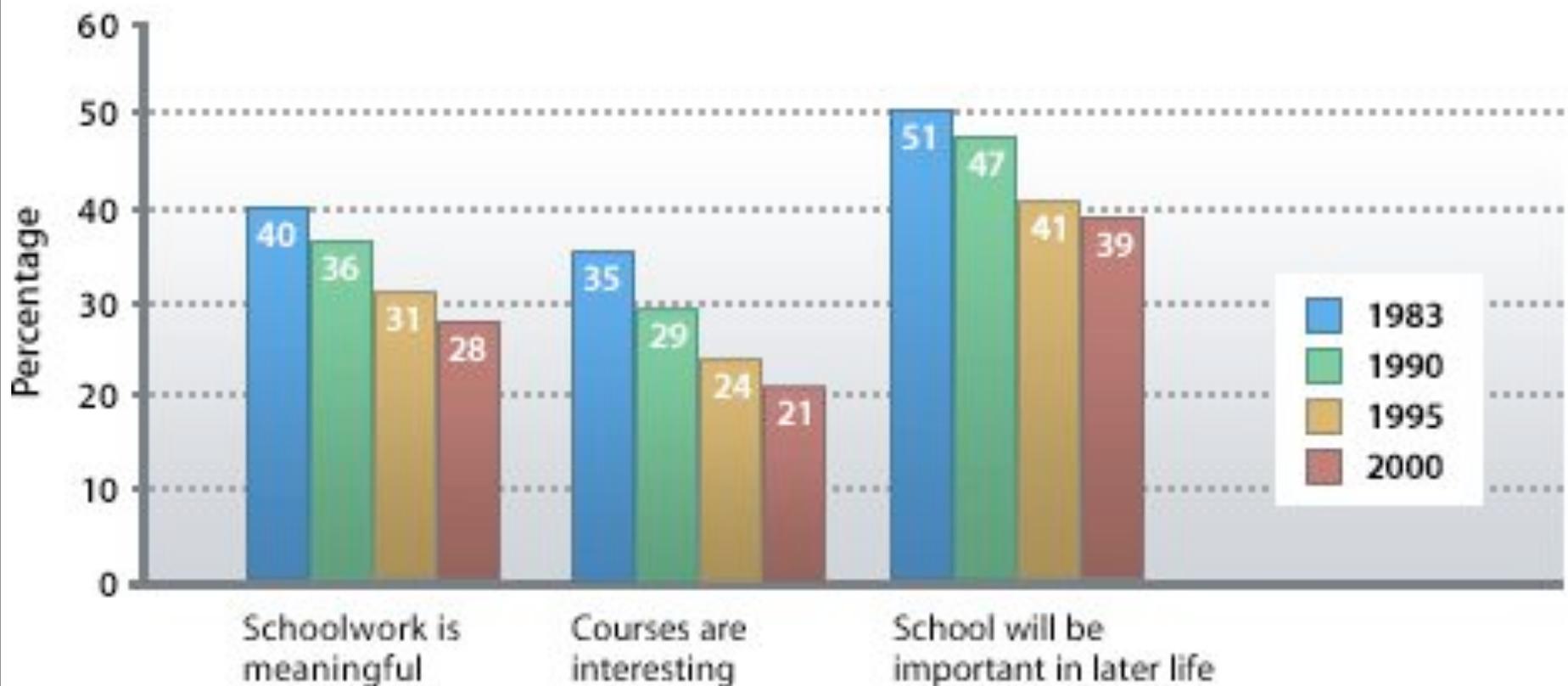
(Sanders and Rivers, 1996)



“If we only took the simple step of assuring that poor and **minority children** had highly qualified teachers, about **half** of the achievement gap would *disappear*.”

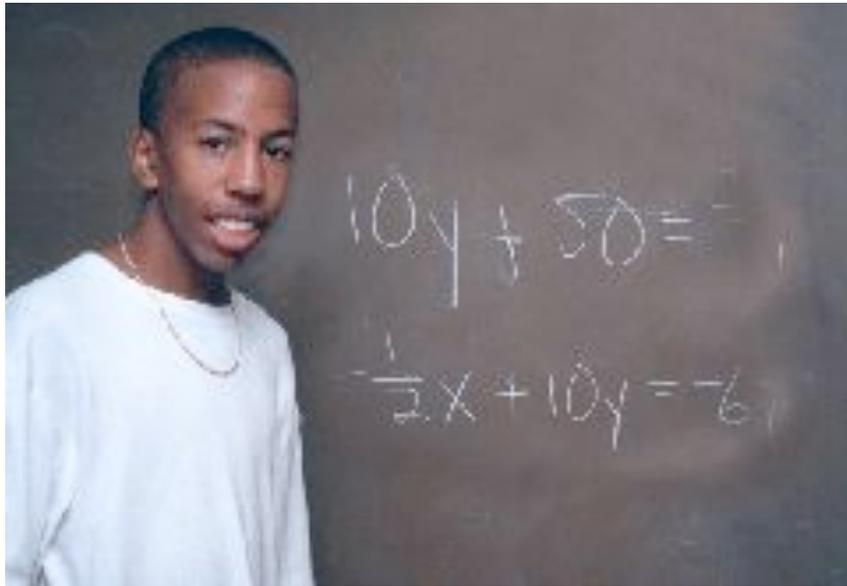
Thinking K-16, Education Trust, 1998

# 12th Graders View of School: 1983-2000



# An Update: 2005

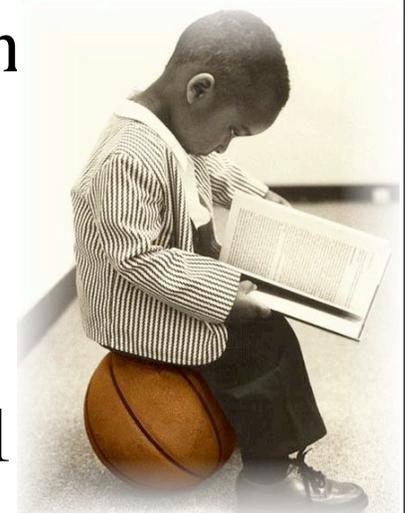
Only 24% of graduates say they were significantly challenged in high school.



- *Achieve's 2005 Survey*

# Develop An Immediate College-Bound Focus

- **83%** of all students who take **Algebra I and Geometry** go to college. Only **27%** of **low-income students** who do not take Algebra I and Geometry go to college.
- **Low-income students** who take Algebra I are **300% more likely** to go to college than those who don't.
- **89%** of students who take **Chemistry** go to college.
- African American males account for only **13** Black college students.



**What do African American students say**  
when asked *‘why they think African American children score lower on standardized tests than children in other student groups?’*

- Environment or community?
- Parents low expectations?
- Poor instruction?
- Poverty?
- Schools?

Taylor, K. L. (2002). Through the eyes of students. *Educational Leadership*. Association for Supervision and Curriculum Development. 72-75.

# What Students Say - Reasons African American Children Do Not Score as High as Children in Other Ethnic Groups

- **31%** - Lack of motivation and simply don't apply self.
- **24%** - Poor instruction
- **18%** - Parents low expectations
- **13%** - Schools
- **11%** - Environment or community
- **Less than 2%** - Poverty
- **Other** - School boards, funding, society

Taylor, K. L. (2002). Through the eyes of students. *Educational Leadership*. Association for Supervision and Curriculum Development. 72-75.

# Factors That Correlate with Student Achievement

## **Before and Beyond School**

- Birthweight
- Lead poisoning
- Hunger and nutrition
- Reading to young children
- Television watching
- Parent availability
- Student mobility
- Parent participation



# Factors That Correlate with Student Achievement

## **In School**

- Rigor of curriculum
- Teacher experience and attendance
- Teacher preparation
- Class size
- Technology-related instruction
- School safety



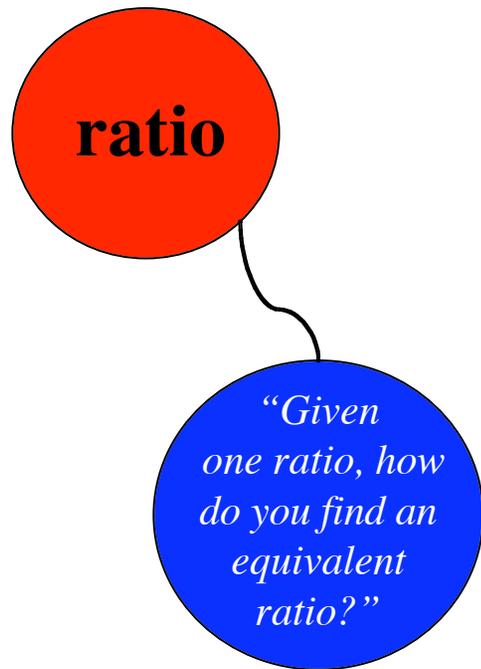
# “High Leverage” Strategies

- Develop number sense.
- Develop a relational understanding of concepts.
- Express a deep belief in the capabilities of students.
- Enable students to use mathematics as a tool for examining issues related to race, ethnicity, gender, and social class (Sleeter, 1997; Tate, 1995).
- **Create an environment where students are able to find and justify their solutions, question other students and communicate their responses to the same or different questions.**
- Develop partnerships with African American male students’ parents.

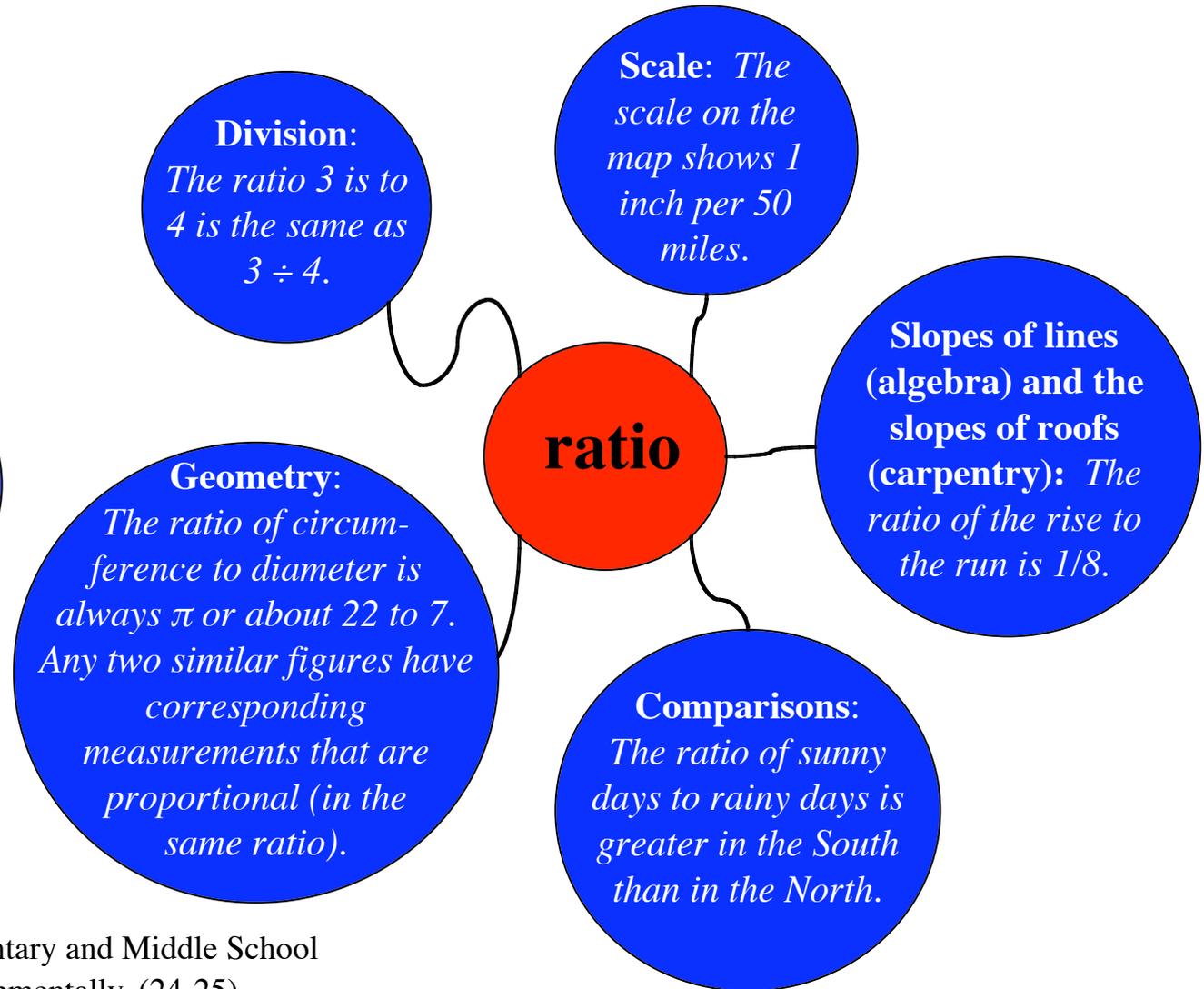


Strutchens, M. (2000). Confronting beliefs and stereotypes that impede the mathematical empowerment of african american students. Changing the Faces of Mathematics: Perspectives on African Americans, NCTM.

# Instrumental Understanding

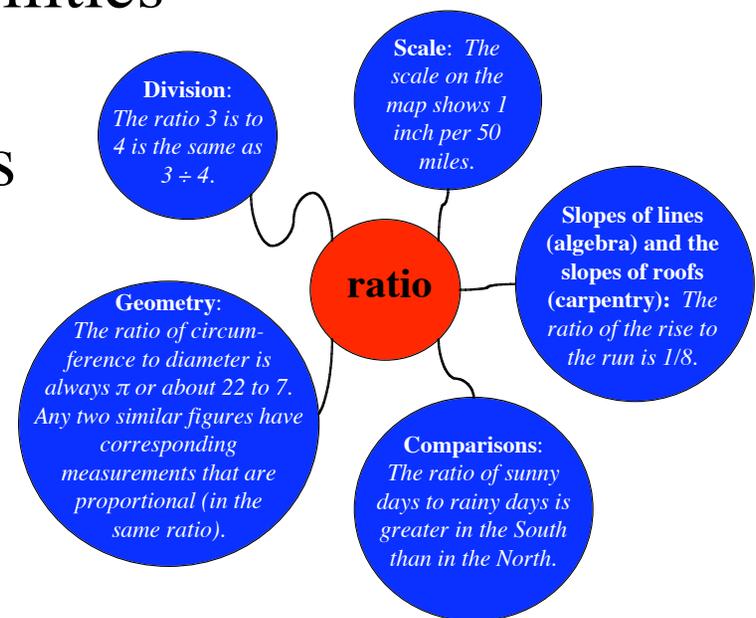


# Relational Understanding



# Benefits of Developing Relational Understanding

- It's intrinsically rewarding
- It enhances memory
- There is less to remember (memorize)
- It helps with learning new concepts and procedures
- It improves problem-solving abilities
- It is self-generative
- It improves attitudes and beliefs



# Setting the Stage: The Learning Environment



1. Stress reading (*Yes reading*, even during mathematics) **EVERYDAY.**
2. Commit to re-teach skills/concepts that (even after instruction) have not been mastered.
3. **Use higher order thinking questions ONLY.**
4. **Make students use complete sentences ALWAYS (Different ways of speaking are appropriate for different settings.).**
5. **Make every child participate in EVERY class, EVERYDAY.**



6. Provide structure.
7. Have a multi-cultural component(s).
8. Teach them *a grade level ahead* and tell them why.
9. Get emotionally involved in class.

Based on the work of Mr. Larry Bell, Multicultural America, Inc.

# Communication (Maryland VSC)

- Use multiple representations to express mathematical concepts and solutions.
- Represent problem situations and express their solutions using pictorial, tabular, graphical, and algebraic methods.
- Use mathematical language and symbolism appropriately.
- Describe situations mathematically by providing mathematical ideas and evidence in written form.
- Present results in written form.

# BCRs/ECRs

- “... Use numbers and/or words in your explanation.”
- “... Use numbers, words, and/or symbols (also graphs, tables equations, etc.) in your explanation.”

Name \_\_\_\_\_ Date \_\_\_\_\_

Four children have 3 bags of M&Ms. They decide to open all 3 bags of candy and share the M&Ms fairly. There are 52 M&M candies in each bag.

**Step A**  
How many M&M candies did each child get?

\_\_\_\_\_

**Step B**  
Explain why your answer is correct.  
Use what you know about numbers and operations in your explanation.  
Use words and/or numbers in your explanation.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

$$\frac{3}{4} \div \frac{1}{2}$$

Could you illustrate (draw) the solution to this problem?

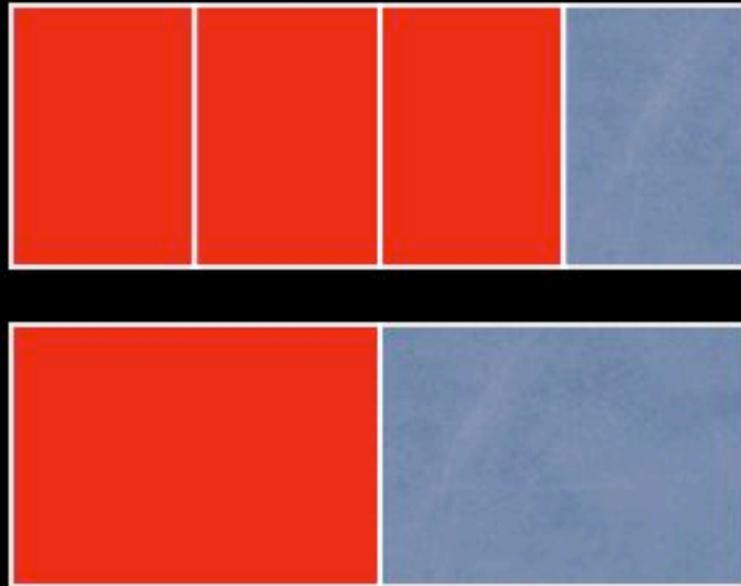
Solve without using the traditional algorithm (Change the  $\div$  to  $\times$ , flip the second fraction, ...)

Using the traditional  
algorithm:

$$\frac{3}{4} \div \frac{1}{2}$$

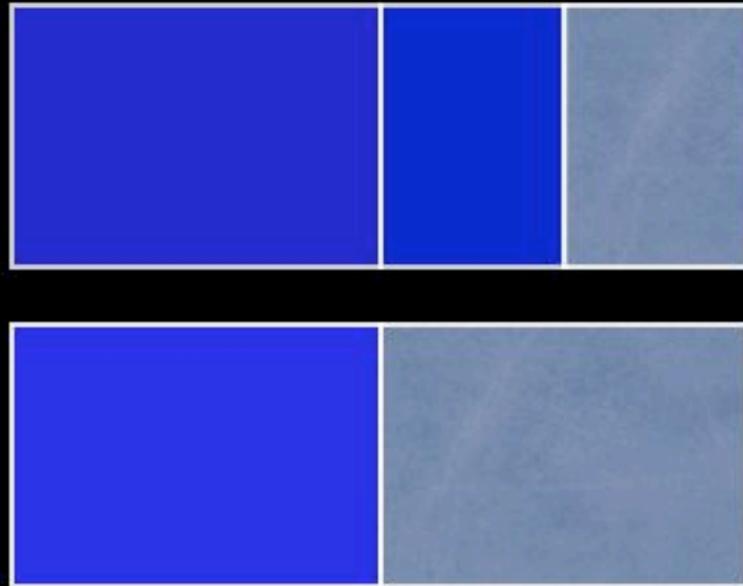
$$\frac{3}{4} \times \frac{2}{1} = \frac{6}{4} = 1 \frac{2}{4} \text{ or } 1 \frac{1}{2}$$

$$\frac{3}{4} \div \frac{1}{2}$$



“How many halves are there in  $\frac{3}{4}$ ?”

$$\frac{3}{4} \div \frac{1}{2}$$



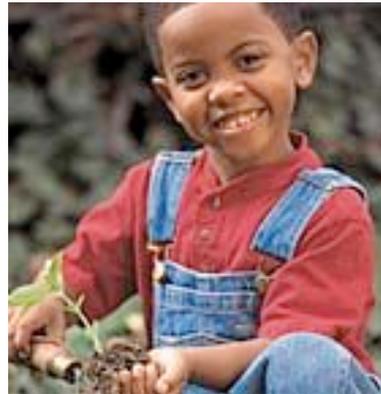
There are ONE and ONE-HALF ( $1 \frac{1}{2}$ ),  
HALVES in three-fourths.

# More on Procedural Understanding

“Students who have learned only procedural skills and have little understanding of mathematics will have limited access to advanced schooling, better jobs, and other opportunities. If any group of students is deprived of the opportunity to learn with understanding, they are condemned to second-class status in society, or worse.”

*Adding It Up*, 2001 (144)

# Language: The Twelve Words ("The Verbs of Doing Mathematics")



Twelve words that “trip-up” the struggling student on standardized tests.

Based on the work of Mr. Larry Bell, Multicultural America, Inc.

# 12 Words That “Trip-up” Struggling Students on Standardized Tests

## (“The Verbs of Doing Mathematics”)

Analyze

Compare

Describe

Explain

Explore

Construct

Predict

Represent

Investigate

Justify

Solve

Discover

# 12 Words

- What are ways that every teacher can make these words a part of student vocabulary?
- What are ways schools can make these words a part of the student vocabulary?
- What are ways teachers can involve parents in helping make these words a part of the student vocabulary?

Four children have 3 bags of M&Ms. They decide to open all 3 bags of candy and share the M&Ms fairly. There are 52 M&M candies in each bag.

### **Step A**

How many M&M candies did each child get?

### **Step B**

Explain why your answer is correct.

Use what you know about numbers and operations in your explanation.

Use words and/or numbers in your explanation.

# A.B.C.

Getting children to do some sort of

**A**ctivity **B**efore **C**ontent

(BTW - This is a common ELL strategy....)

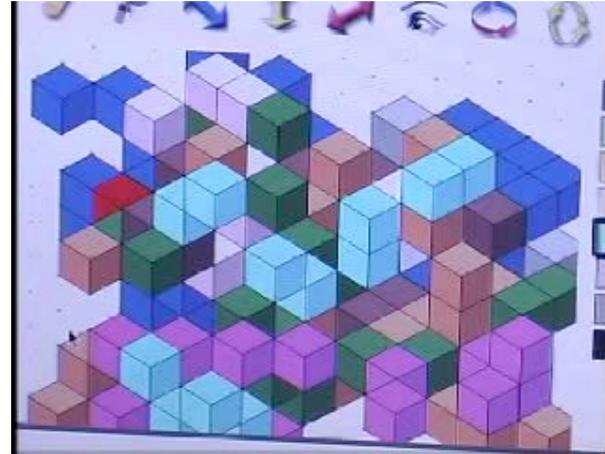
# “Play-Acting”

\_\_\_\_\_ children have \_\_\_\_\_ bags of M&Ms. They decide to open all \_\_\_\_\_ bags of candy and share the M&Ms fairly. There are \_\_\_\_\_ M&M candies in each bag.

## **Step A**

How many M&M candies did each child get?

# The Role of Technology



- Increased use of technology and computer education has led to greater engagement among boys and fewer discipline problems in the classroom (Draves, 2002; Tyrer, 1999; West, 2001).
- “Although some schools are transitioning to a *Web-based Technology Age* to better serve the needs of society and simultaneously engage boys’ interests, **other schools are still training students for the Industrial Age (Draves, 2002).**”

# Their World

phones tivo

ps2 & x box

blackberry

fax books

pda games

car dvd tv

video conf.

magazines

net mobile phones

mp3 player

pda movies :\*

instant messaging



web movies

bluetooth

:P records

email mtv

:) cable tv

cnn pagers

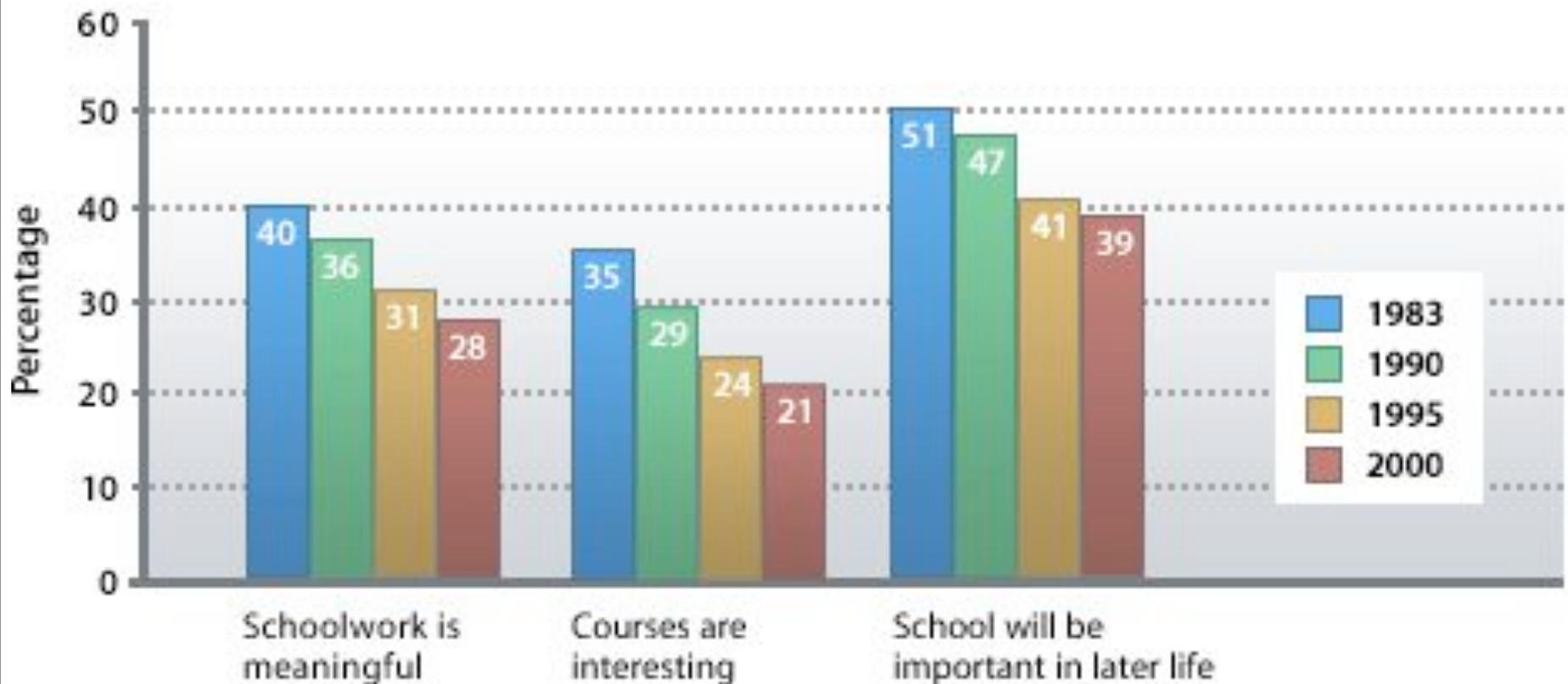
cd/dvd vhs

tm phone

satellite tv

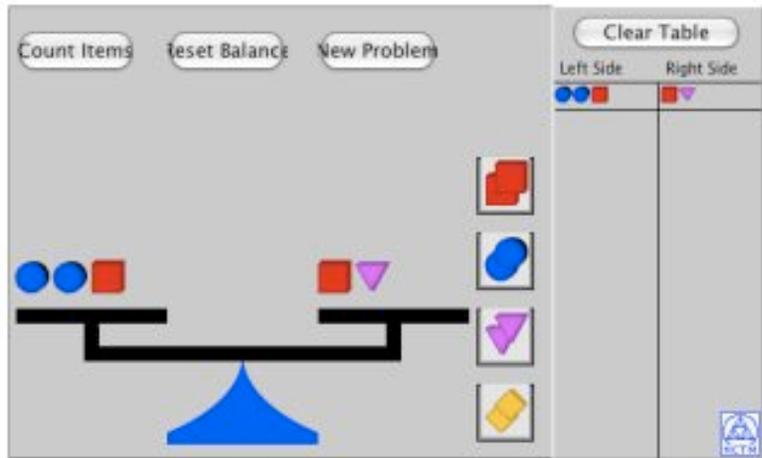
radio wifi computers cassette

# 12th Graders View of School: 1983-2000



“We can no longer even imagine a world of work where executives, engineers, secretaries, and salespeople all wait at their desks for a once-a-week opportunity to use a computer lab at the end of the hall. The days of students waiting for their turn with technology tools must likewise end.”

The use of electronic manipulatives, screen captures, and *MS Word* to explore, represent, reason, communicate, make connections, problem solve, etc.



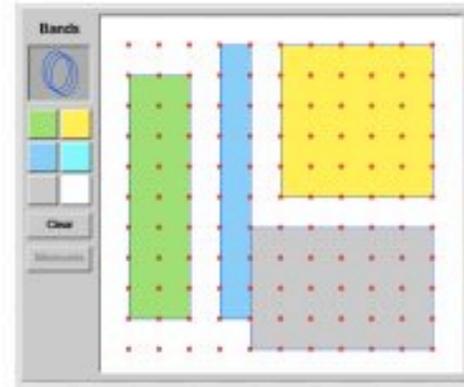
I first placed a red square on the left side of the balance. I then placed a purple triangle on the right side. If you took away the two red squares, you would have two circles equal to one purple triangle.

### Brief Constructed Response

#### Step A

Jordan has enough money to buy 20 feet of fence material. He wants to build a pen for his new pet.

What is the largest closed area that Jordan can design for his pen?



#### Step B

Explain why your answer is correct.

Use what you know about area in your explanation.

Use words and/or numbers in your explanation.

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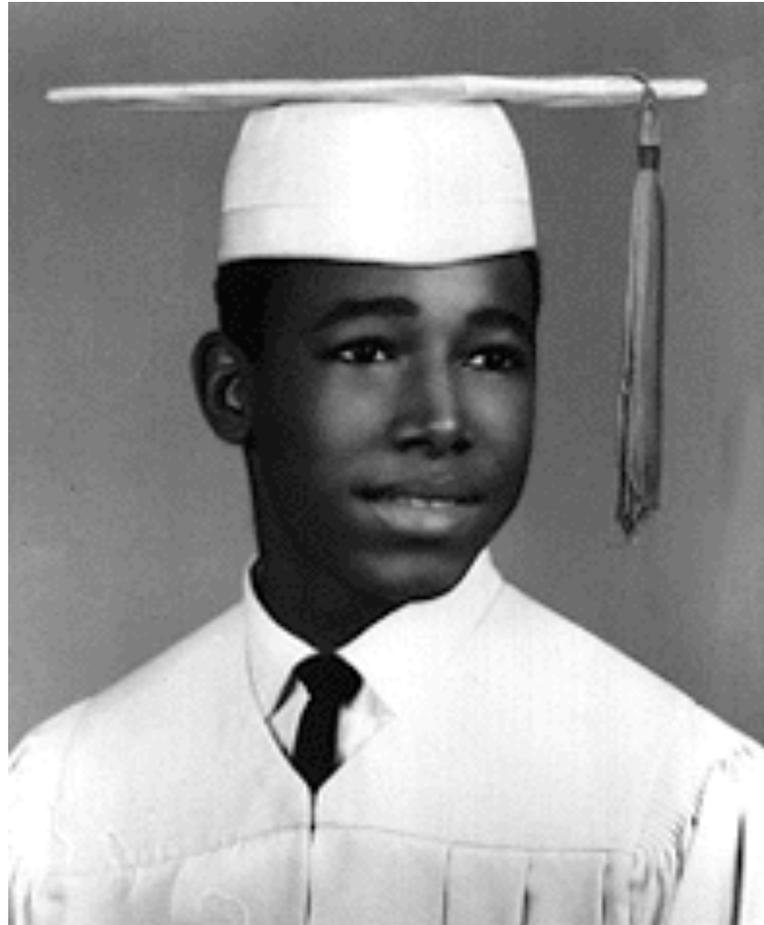
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***"I really felt I was the stupidest kid in the fifth grade."***



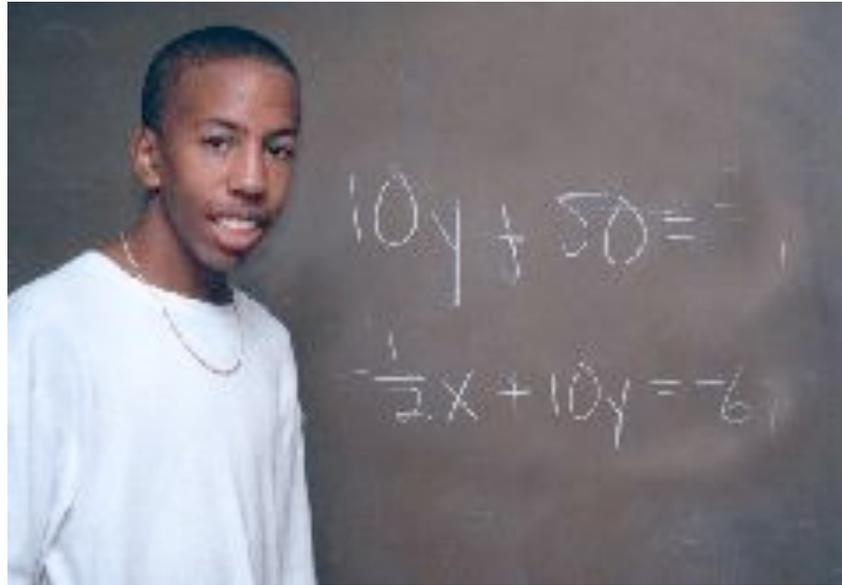
BENJAMIN S. CARSON, M.D.

Pediatric Neurosurgeon

“And I became excited and began to visualize myself in intellectual capacities, and, you know, within the space of a year and a half, I went from the bottom of the class to the top of the class. And one of the interesting things is, when I thought I was stupid, I conducted myself like a stupid person, and therefore I achieved like a stupid person; and when I was smart-- or I was smart all along, obviously-- *but when I thought I was smart, I began to conduct myself accordingly and to begin to achieve accordingly.*

So it says a whole lot about expectations, and this is one of the critical areas in our society right now.”

- B. Carson, 9/7/99



# A 10 Step Process for Helping Students Master Critical Concepts

Adapted from the work of Mr. Larry Bell, Multicultural America, Inc.

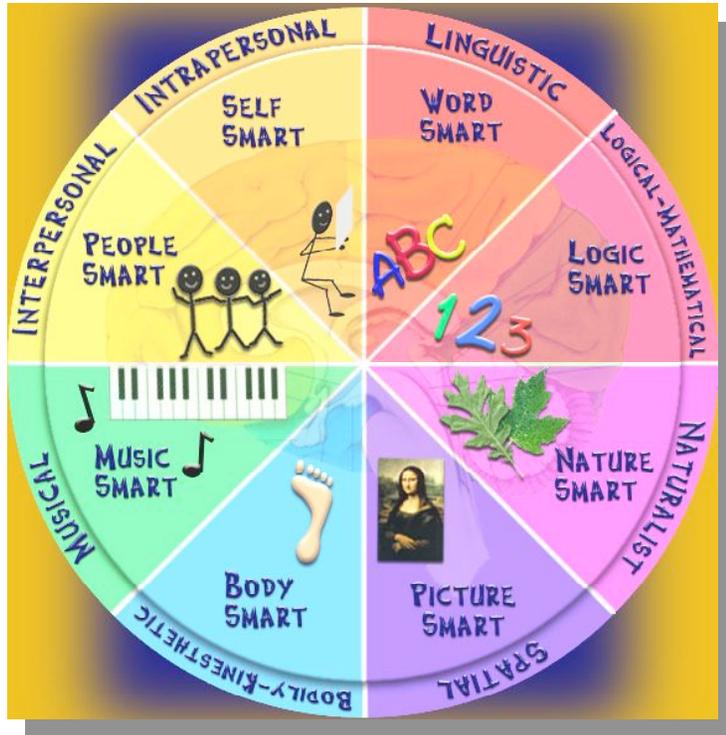
# Teaching Critical Concepts: An Immersion Model

1. Choose a grade level.
2. Make a list of the top two critical mathematics concepts taught in that grade level.
3. Demonstrate the finished product and then take students through the steps.
4. Provide clear expectations
  - Give students the criteria, target, rubric, etc.



Based on the work of Mr. Larry Bell, Multicultural America, Inc.

# Teaching Critical Concepts



Based on the work of Mr. Larry Bell,  
Multicultural America, Inc.

5. **Totally immerse kids in the area of difficulty.**
  - Say it, write it, draw it, build it, make projects, create plays, take field trips, sing about it, make/play games related to it, etc. (Use a Multiple Ability/Intelligence approach)
6. **Total engagement in activities. Every child must respond (be active contributors).**
7. **Personal responsibility - Show students their part.**

# Teaching Critical Concepts

8. Allow students to practice the critical concepts.
9. Approximation - Partial credit when kids demonstrate progress
10. And one more-- Assess and adjust the 9 prior steps
  - “What would I do differently the next time I teach these concepts?”



# Disproportionate Statistics

- 49% of prison inmates nationally are African American, compared to their 13% share of the overall population. <sup>1</sup>
- Nearly one in three (32%) black males in the age group 20-29 is under some form of criminal justice supervision on any given day--either in prison or jail, or on probation or parole. <sup>2</sup>
- As of 1995, one in fourteen (7%) adult black males was incarcerated in prison or jail on any given day, representing a doubling of this rate from 1985. The 1995 figure for white males was 1%.
- A black male born in 1991 has a 29% chance of spending time in prison at some point in his life. The figure for white males is 4%, and for Hispanics, 16%.

<sup>1</sup> Unless otherwise specified, all data on prison and jail populations throughout is taken from various reports of the Bureau of Justice Statistics.

<sup>2</sup> Marc Mauer and Tracy Huling, "Young Black Americans and the Criminal Justice System: Five Years Later," The Sentencing Project, October 1995.

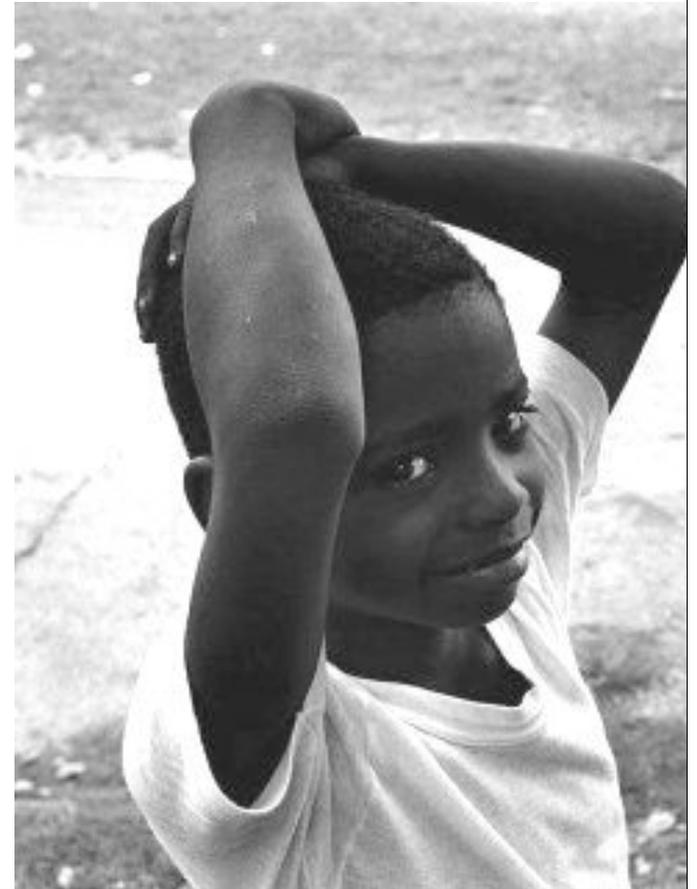
# The Future Picture Using the Mathematics of Gender Ratios

- Ratio of African American males to African American females at birth is **102:100**
- Ratio of African American males to African American females (by age range 40-44) is **86:100**
- Ratio of White males to White females (by age range 40-44) is **100:100**

# High Expectations: A Result of Positive Discrepancies in Teacher Judgment

“Researchers have now verified the long-term value of establishing high expectations, finding that the degree to which teachers overestimated students’ intelligence at an early age correlated with the student’s high school grade point averages and SAT scores.”

Hrabowski, F. (2002). Raising minority achievement in science and math. *Educational Leadership*. Association for Supervision and Curriculum Development. 46.

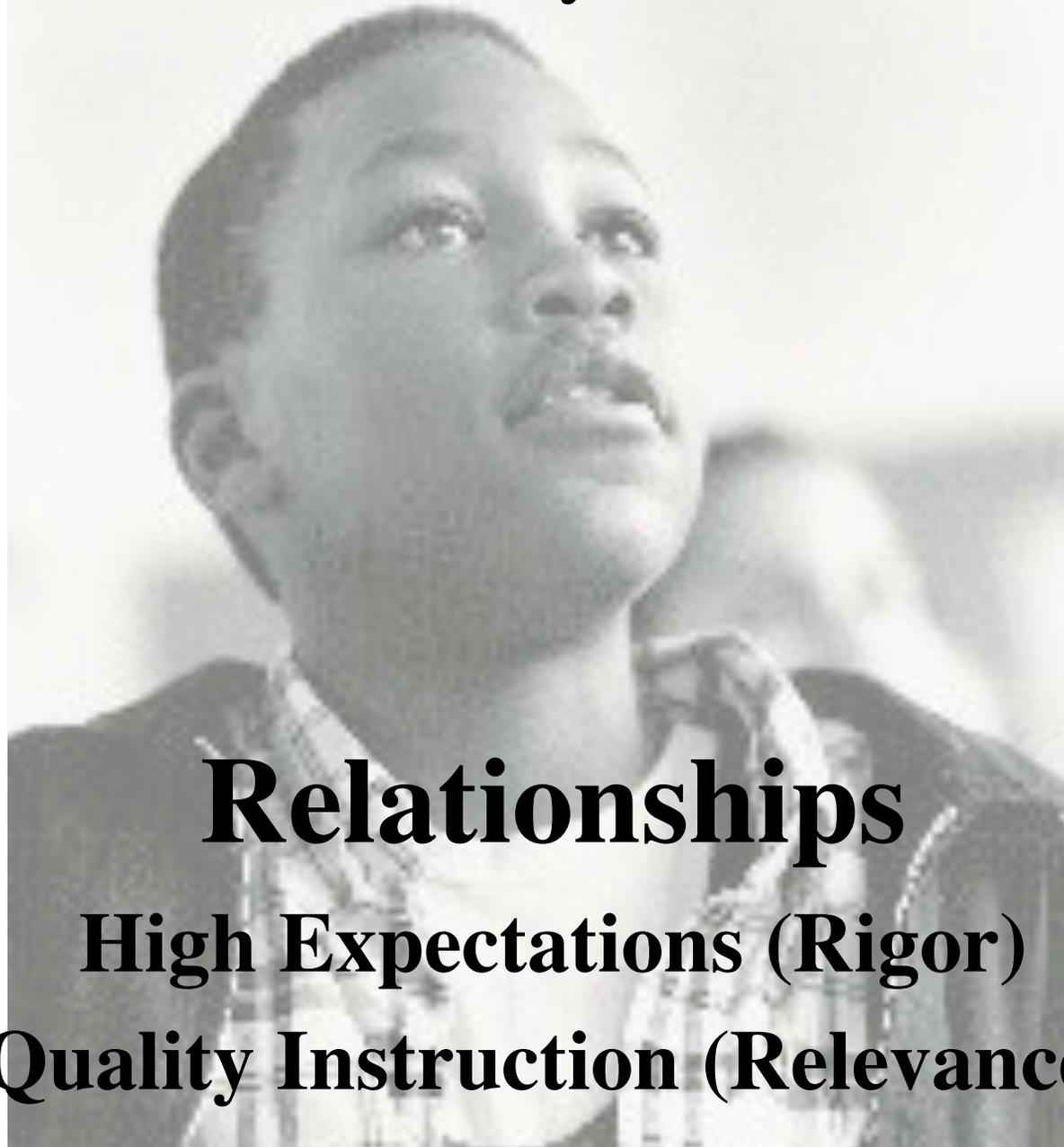


# More Learning Leads to Better Earning

<b>Education</b>	<b>Average Annual Earnings</b>	<b>Average Lifetime Earnings</b>
High School Dropout	\$22,000	\$1.1 million
High School Diploma	\$31,000	\$1.4 million
Associate's Degree	\$38,000	\$1.8 million
Bachelor's Degree	\$50,000	\$2.5 million

Source: Baum, Sandy, and Kathleen Payea, *Education Pays 2004: The Benefits of Higher Education for Individuals and Society*, College Board, 2004.

... It's Really About



**Relationships**

**High Expectations (Rigor)**

**Quality Instruction (Relevance)**