

2005

# Perceptions of the Mathematics Achievement Gap: A Survey of NCTM Membership

Robert Q. Berry

Linda Bol  
*Old Dominion University*

Follow this and additional works at: [https://digitalcommons.odu.edu/efl\\_fac\\_pubs](https://digitalcommons.odu.edu/efl_fac_pubs)



Part of the [Educational Leadership Commons](#), and the [Science and Mathematics Education Commons](#)

---

## Repository Citation

Berry, Robert Q. and Bol, Linda, "Perceptions of the Mathematics Achievement Gap: A Survey of NCTM Membership" (2005). *Educational Foundations & Leadership Faculty Publications*. 33.  
[https://digitalcommons.odu.edu/efl\\_fac\\_pubs/33](https://digitalcommons.odu.edu/efl_fac_pubs/33)

## Original Publication Citation

Berry, R., & Bol, L. (2005). *Perceptions of the mathematics achievement gap: A survey of NCTM membership*. Paper presented at the 27th Annual Meeting of PME-NA: North American Chapter of the International Group for the Psychology of Mathematics Education, Roanoke, VA, October 20-23, 2005.

## PERCEPTIONS OF THE MATHEMATICS ACHIEVEMENT GAP: A SURVEY OF THE NCTM MEMBERSHIP

Robert Q. Berry, III  
University of Virginia  
[rqb3e@virginia.edu](mailto:rqb3e@virginia.edu)

Linda Bol  
Old Dominion University  
[lbol@odu.edu](mailto:lbol@odu.edu)

There is increasing concern among educators about the disparities that exist among ethnic groups in mathematics achievement. There is no simple explanation for the achievement gap. However, it is important to recognize that the achievement gap is not a result of membership in any group, but is instead a result of the conditions of education (Thompson & O'Quinn, 2001). Consequently, a variety of school, community, and home factors seem to underlie or contribute to the gap. For example, the lower mathematics achievement levels of minority students, particularly Black students, may be indicative of the curriculum and instruction these students receive (Lubienski, 2003). Other researchers have highlighted differences in teachers' expectations of students as a function of race, gender, and social class which influence achievement (Berry, 2004; Ferguson, 1998). However, there are few studies that have surveyed educators to explore their explanations of the achievement gap in mathematics.

Therefore, the purpose of this study was to survey the perceptions of members of the National Council of the Teachers of Mathematics (NCTM) on the achievement gap in mathematics education. For the purposes of this study the achievement gap was defined as an indicator of disparities between groups of students usually identified (accurately or not) by racial, ethnic, linguistic or socio economic class with regard to a variety of measures (attrition and enrollment rates, drug use, health, alienation for school and society attitude toward mathematics, as well as test scores). More specifically the following research questions were addressed:

- (1) What do respondents perceive to be the most important contributors to the achievement gap in mathematics?
- (2) Do these perceptions vary as a function of personal characteristics of the respondent (i.e., gender, ethnicity, or age)?
- (3) Do these perceptions vary as a function of characteristics related to employment (i.e., position held, years of experience, or educational degree)?

### Method

Data was collected via an online survey sent to a random sample of the NCTM membership. At the time of the survey, there were a total of 41,508 NCTM members in the population to draw the sample from. The random sample was composed of 5,000 non-student NCTM members. On March 9, 2004, the sampling of the NCTM membership received an email containing the URL link that opened the online survey. The online survey closed on March 29, 2004. Eight hundred seventy members from the random sample visited the website and 623 members completed the survey.

### Data Sources

The data source was the questionnaire developed by the researchers. The first section contained items requesting information on demographic and employment characteristics. The next sections presented 23 rating scale items pertaining to factors contributing to the

achievement gap. The items were organized into five sub-areas or scales and included (1) Background and Societal Influences, (2) Student Characteristics, (3) Curriculum and Instruction, (4) Politics and Policy, and (5) Language. Respondents were asked to rate the extent to which they agreed with the statement on 5-point Likert-type scale, ranging from “strongly disagree” (1) to “strongly agree” (5).

A factor analysis (principal components extraction method with varimax rotation) was conducted to empirically investigate the validity of the rating scale items. The results supported only 4 scales. The component matrix did not support the original scale called Background and Societal Influences. The final solution of four factors, all with eigen values greater than one, accounted for 52 percent of the variance. Reliability coefficients (Cronbach’s alphas) for each of the scales ranged from a low of .61 to a high of .85. More detailed results and explanation of the factor analyses supporting the subscales appear in an article by Bol & Berry (2005).

### Highlights of the Results

The results pertaining to the first research question highlight the complex nature of peoples’ perceptions of the achievement gap. When looking at the items that were most strongly endorsed as contributors to the achievement gap, educators endorsed items related to student characteristics that focused on family support, student motivation, peer pressure, and intellectual ability. The mean ratings on these items were 4.00 or above. This is important because these factors can be perceived as primarily non-school factors that are more resistant to educational interventions. The mean ratings obtained on the other three scales were similar and somewhat lower, suggesting moderate levels of agreement.

The second research question addressed whether perceptions differed as function of personal characteristics of the respondents. Minority respondents were significantly more likely to agree that factors related to curriculum and instruction contributed to the achievement gap. A significant effect for gender was observed on the Language scale. Females were more likely to attribute the achievement gap to language differences or difficulties.

When examining the variation in factor scores by employment position, we found significant differences between mathematics supervisors and teachers across all grade levels on the Student Characteristic scale. This presents a dilemma because teachers who interact with students on a daily basis perceive that factors such as peer pressure, family support, motivation, intellect, and interest in mathematics are more contributory to the achievement gap than do mathematics supervisors. Perhaps, daily contact with students makes teachers more attuned to student characteristics as a contributory factor on student achievement.

Our findings illuminate mathematics educators’ perceptions of the causes of the achievement gap. Additionally, they may inform future studies on interventions or strategies aimed at alleviating this gap.

### References

- Berry, III, R.Q. (2004). The Equity Principle through the voices of African American males. *Mathematics Teaching in the Middle School*, 10, 100-103.
- Bol, L., & Berry, III, R.Q. (2005). Secondary mathematics teachers’ perceptions of the achievement gap. *The High School Journal*, 88 (4), 32-46.
- Ferguson, R.F. (1998). Teachers’ perceptions and expectations and Black-White test score gap. In C. Jencks & M. Phillips (Eds.), *The Black-White test score gap* (pp. 273-317). Washington, DC: Brookings Institution Press.

- Lubienski, S.T. (2003). A closer look at the Black-White mathematics gaps: Intersections of race, class, and SES in NAEP achievement and instructional practices data. *Journal of Negro Education*, 71, 269-287.
- Thompson, C. L., & O'Quinn, S. D. (2001). *Eliminating the Black-White achievement gap: A summary of research*. Chapel Hill: The North Carolina Education Research Council.